COMPUTERWORLD

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Conti Biased, Jurors Say

By Catherine Arnst
CW Staff

SAN FRANCISCO — Four of the jurors in the recently ended Memorex Corp. vs. IBM antitrust trial stated in affidavits that presiding Judge Samuel Conti was biased in favor of IBM.

Those affidavits, taken by Memorex attorneys after Conti issued a directed verdict in favor of IBM [CW, Aug. 21], also revealed that at one point the jury would have delivered a verdict in Memorex's favor except for an instruction from Conti which they believed prohibited them from compromising. The trial

(Continued on Page 4)

Claims 10% Power Edge

Cambridge Unveils 370-Type CPUs

By Jeffry Beeler
CW Staff

WALTHAM, Mass. — Cambridge Memories, Inc. last week joined the ranks of 370-compatible mainframe suppliers when it announced a family of three medium-scale processors that reportedly provide 10% to 15% greater processing power at 20% lower cost than the IBM machines they emulate — the 370/115, 125 and 135.

Each of the 32-bit machines runs IBM DOS/VS, VS1, VS2 operating systems or the VM/370 environment with almost no modifications and accepts most application programs written for comparable IBM CPUs, according to Cambridge Memories.

The plug-compatible processors also incorporate a standard 370 universal instruction set with 174 basic instructions, all of which are implemented in microcode. This heavy reliance on firmware and the resulting deemphasis on hardware circuitry ease debugging, simplify the addition of hardware enhancements and permit the mainframes to accommodate almost any change in IBM operating systems, the sources said.

In addition, the machines support almost all IBM or IBM-compatible peripherals accommodated by 370 processors in the 138-and-below performance range, they added. The only exceptions are said to be peripherals requiring direct control or external signal features.

Although Cambridge Memories has yet to name its processor family, the firm tentatively calls the three series members the models 1, 2 and 3. Model 1, the 115-class CPU, has a machine cycle time ranging from 480- to 1,130 nsec and expands in 128K-byte increments from 256K bytes to 768K bytes of semiconductor main memory, the company reported.

Model 2, equivalent to the 370/125, has a machine cycle time ranging from 300- to 950 nsec and expands in 128K-byte increments from 512K bytes to 1M byte. Model 3, meanwhile, compares with the 135, has a machine cycle from 180- to 850 nsec and expands from 512K bytes to 2M bytes in 256K-byte increments.

Both the models 1 and 2 transfer up to 2.6 million byte/sec, while the Model 3 runs as fast as 3.7 million byte/sec, the sources said.

All three plug-compatible versions provide enough slots in their CPU chassis to accommodate up to 13 processor, memory and I/O boards. Users can upgrade the mainframes from a basic Model 1 to a fully loaded Model 3 simply by plugging additional

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Microcode: IBM Market Tool?

The microcode IBM is using in its mainframes may provide marketing advantages for the company as well as operating benefits for the user. This article, the first of a two-part series, looks at the dual effect of IBM microcode.

By Charles A. Cornell
Special to CW

Extended Control Program Support (ECPS) is the most widely used of the IBM features that perform through microcode functions that were previously performed by software in 370-type machines.

Those with the most at stake regarding ECPS are the manufacturers and users of 370-compatible mainframes. But the future direction of ECPS and similar features is likely to have a broader impact, especially for systems software houses and other computer users who have made extensive modifications to IBM operating system software.

Many IBM watchers believe ECPS is merely a stopgap measure — an attempt by IBM to improve the performance of its current hardware products in response to the performance improvements offered by plug-compatible products. Because there are software routines available that correspond to the new assist features, there is no reason to be concerned about simple performance improvements.

A thorough technical evaluation of ECPS, however, supports a very different conclusion. IBM appears to be developing software that can be executed only on IBM hardware, and ECPS may well be the leading edge of IBM's future strategy — a strategy aimed directly against 370-compatible vendors and their users.

A better understanding of how ECPS

(Continued on Page 6)

Datapoint 1800 Handles Cobol, Runs With ARC

By Don Leavitt
CW Staff

SAN ANTONIO, Texas — Described as the company's lowest cost system capable of supporting interactive Cobol as well as other languages, the 1800 Dispersed Processor now available from Datapoint Corp. can run as a stand-alone system or as part of larger configurations.

The 1800 is built around a slowed-down 1500 processor, with 60K bytes of user memory. It can be used as part of an Attached Resource Computer (ARC) system or as part of a wider, geographically dispersed network, a spokesman said.

The ARC system concept, introduced last year [CW, Dec. 1], links Datapoint processors to form integrated systems of virtually limitless size. This leads to efficient use of system resources and provides a data base common to all users as well as an easy, modular growth path, he claimed.

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U.S. Paper on Data Flow Draws Fire From Industry

By Edith Holmes
CW Washington Bureau

WASHINGTON, D.C. — An eleventh-hour U.S. position paper on the movement of data across national borders has drawn fire from American DP spokesmen.

The Association of Data Processing Service Organizations (Adapso) and the Computer and Business Equipment Manufacturers Association (Cbema) claim they were not notified of this substance of the U.S. stance on guidelines on transborder data barriers and the protection of privacy before its delivery at a mid-July meeting of the Organization for Economic Cooperation and Development (OECD) in Stockholm, Sweden.

Though it has been officially cleared by the U.S. government since the Stockholm meeting, the American paper was criticized by industry sources at a recent public meeting in Washington as "vague," "broad" and failing to put the U.S. in a leadership role in the drafting of transborder data flow and privacy guidelines.

However, U.S. officials contend they were faced with a last-minute need to pull an American statement together to counter a set of draft guidelines based on the European privacy model and presented to the OECD group charged with forming guidelines on transborder data barriers and privacy protection. Written the night before the meeting of the eight nations involved, the U.S. paper couldn't be circulated for industry comments, according to William Fishman, U.S. delegate to the meeting and an official with the National Telecommunications and Information Administration (NTIA).

The European approach to privacy

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Exhaustive Search for Mini Well Worth It, User Finds

By Jeffry Beeler
CW Staff

CHICAGO — "Our selection process was so detailed, so precise, so comprehensive that it may well serve as a model for other companies about to buy their first system," Brunswick Corp.'s John Mikusa boasted following his firm's installation of its first minicomputerized bowling league recordkeeping systems.

Brunswick, a bowling alley equipment supplier, rated nearly two dozen minicomputer vendors according to 17 technical, support and financial criteria before finally selecting the hardware for its Integrated Retail Bowling Information Systems (Irbis), according to Mikusa, controller for the firm's Recreational Centers Division.

The four-step evaluation process proved time-consuming, but company officials like project manager Carl Ulrich predict the benefits Brunswick will derive will easily justify the effort spent in selecting the systems.

To choose the most suitable hardware

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A CW Special Report on Minicomputers and Small Business Systems follows Page 50.

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A Grimm Experience

City Funds, Programmer Disappear

By Tim Scannell
CW Staff

BELMONT, Calif. — Faulty computer programs and a multitude of unforeseen expenses have convinced officials here to sell the city's $85,000 minicomputer and return to using their office accounting machine to maintain municipal financial records.

Problems with the computer, which was acquired a little more than a year ago, allegedly center around a programmer identified as Richard Grimm, who was hired by Belmont to program the city's Digital Equipment Corp. PDP-11/34. Grimm disappeared last March before the job was finished, according to City Manager James DeChaine.

After his disappearance, officials discovered the programmer's work was not only ineffective, but he had bilked Belmont and surrounding communities out of nearly $250,000 in public agency funds, DeChaine said.

Grimm was apparently recommended to Belmont officials by DEC representatives who were marketing the equipment through U.S. Leasing, a San Francisco-based firm. "He was doing some work on DEC equipment in other communities and when DEC sold us the equipment, it made us aware of his services," DeChaine explained.

However, it was later discovered that DEC was "misinformed" about Grimm's qualifications with regard to its equipment. "DEC's people recommended him because they believed he was very knowledgeable in the use of their equipment," DeChaine continued, "but after we bought the package deal, we found this was not really the case."

A DEC spokesman at the company's headquarters in Maynard, Mass., was apparently unfamiliar with the situation at Belmont and declined to comment until further "details" are investigated.

Although details on Grimm's background as a programmer are sketchy, DeChaine conceded he was apparently familiar with IBM systems. "We later found out, after he was long gone, that he had also served time in Pennsylvania State Penitentiary," DeChaine stated.

Forgery Involved

During the scheme, Grimm allegedly forged $89,000 in checks which were subsequently cashed in communites in the San Francisco Bay area. According to DeChaine, he also managed to convince both Belmont and U.S. Leasing to pay him double the $10,000 programmer's fee originally agreed upon for his services.

"We were going to pay this guy for the software design and then U.S. Leasing was going to pay us back what we paid Grimm," DeChaine pointed out. "Then, over a period of years, [Belmont] was going to reimburse U.S. Leasing for those monies."

However, Grimm apparently approached a representative of the leasing firm and had his name substituted on the contract as the payee from U.S. Leasing, DeChaine said. "So, we paid him and U.S. Leasing paid him, rather than U.S. Leasing paying us."

Meanwhile, contractual obligations with U.S. Leasing prohibit Belmont from purchasing another computer system — even if a buyer is found for the currently inactive minicomputer.

R.A. Daniels, president of U.S. Leasing, said, "We're being fully cooperative in Belmont's efforts to find another user for the equipment. [DEC] has provided Belmont with its own customer list in trying to find a potential user . . . and we have even provided Belmont with a couple of names of sellers of this type of equipment."

However, Daniels said, there still exists a continuing obligation and "we intend to hold Belmont to the [original] contract."

Cancellation Clause

According to Daniels, the "cancellation clause" which binds Belmont to its initial leasing agreement is not regularly included in every contract drawn up by U.S. Leasing, as reported in at least one local newspaper. Rather, the clause is only inserted when certain "fiscal uncertainties" exist within the customer's agreements.

Daniels admitted that selling machinery or equipment before its lease has expired is not, in general, an unusual situation. Trades or takeovers of small items such as cash registers, microfilm and other types of "general-purpose" equipment transpire "by the hundreds."

However, he observed that Belmont may encounter some difficulty in finding a buyer for the minicomputer because of the very nature of packaged computer systems. "In the case of a computer, there is so much programming and specific application work done, it's very hard to run around and try to find someone who wants to take over a $100,000 or $200,000 system," Daniels said.

"I still have no idea of the full magnitude of all this," the distraught city manager said, referring to the vanished programmer and the inoperative computer system.

"I want to emphasize, however, that DEC and U.S. Leasing are working very closely and cooperatively with us to unravel the whole mess in a manner that will minimize any undue expense," DeChaine added.

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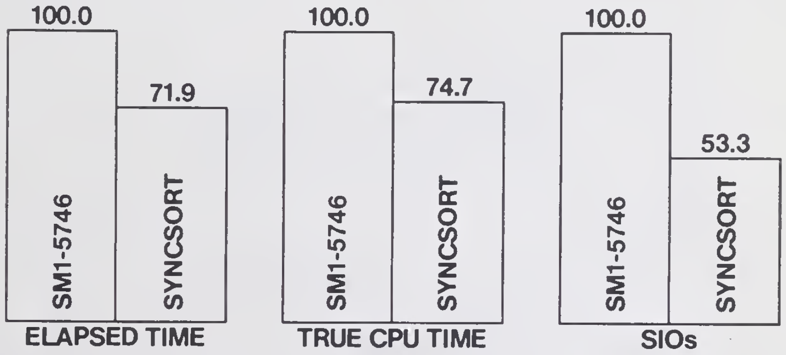
Victims report that they have been attacked, almost immediately, in their computer resources. A sharp stinging sensation in the neck is followed by weakness . . . loss of desire . . . and, ultimately, by an inability to perform even the simplest data-processing function.

Only one effective safeguard exists. Sorters are urged to carry a copy of SyncSort DOS with them *at all times*. If attacked, thrust SyncSort as close to the Vampire's face as possible and repeat loudly: "I challenge you to a benchmark!"

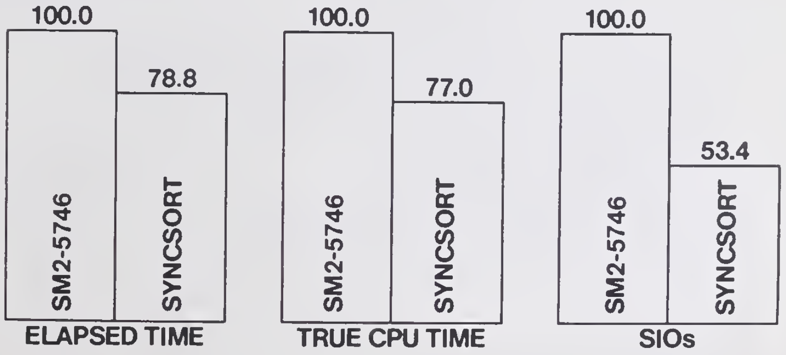
At this the Vampire can be expected to fall back in consternation, shielding his eyes from the light. Moments later he will flee screaming into the night.

The reason for this bizarre behavior, Vampirologists explain, is that no Vampire sort program can endure the thought of being in the same castle with benchmark results that look like this:

SyncSort DOS vs. IBM's SM1-5746.



SyncSort DOS vs. IBM's SM2-5746.



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Memorex Judge Showed Pro-IBM Bias: Jurors

(Continued from Page 1)

ended in a hung jury last month, with the jury split nine to two in favor of Memorex after 19 days of deliberation [CW, July 10].

The affidavits were submitted to the court by Memorex in support of a motion it filed Aug. 18 requesting that Conti reconsider his order striking a jury in the event that a second trial is held. Conti issued an order along with his directed verdict denying any future Memorex requests for a jury if the firm is awarded the right on appeal to try the case again.

Last Monday, Conti denied Memorex's motion to reconsider without comment.

When Conti denied Memorex's right to a jury, he claimed that "the magnitude and complexity of the present lawsuit renders it, as a whole, beyond the ability and competency of any juror to understand and decide rationally" and found that "the record in this case cannot justify a verdict by any reasonable jury in favor of Memorex."

Nine Members Disagree

All nine of the jurors deposed by Memorex, including one of the two who supported IBM, said they did not think the case was too complex to be understood by a jury. Four of those jurors specifically said their observation of Conti's behavior during the trial led them to believe he was biased in favor of IBM.

"By the middle of the third month [the trial lasted five months], I could tell the judge was swinging towards IBM. He treated the two sides differently. He was leaning towards IBM for the rest of the trial," juror Albert Bratovich said.

Juror Jeri Johnson said, "I told Judge Conti that I believed he was biased in his handling of the trial. This became clear to me in many ways, such as, for example, the way he treated the lawyers and the witnesses. It was evident from what he said to them, as well as his manner and tone of voice, that he was harder on the Memorex attorneys and witnesses. I felt his attitude was 'Memorex is really being a pain for bringing this case.' "

Although seven jurors said at the close of the trial they thought the case was too complex to be decided by a jury, some subsequently said that after thinking the question over, they changed their minds and felt a jury, not a judge, should decide the case.

At least three of the jurors said as much in questionnaires Conti asked them to fill out after the trial. Conti did not make those responses public, and Memorex has moved that those questionnaires be made part of the trial record.

Instruction 'Misunderstood'

All but one of the jurors whose affidavits Memorex submitted to the court mentioned that at one point the jurors had agreed on a compromise decision awarding Memorex either $127 million or $158 million in damages (the firm was asking for $306,580,000). However, when the jurors asked Conti if they were allowed to compromise, they interpreted his answer as being a definite no, an interpretation Memorex claims was a "misunderstanding" of Conti's instructions.

"By the very nature of the process of making a decision by a group, a certain amount of compromise is a proper and necessary part of the decision-making process. The jurors were interpreting the court's instructions to mean they could not compromise at all...When the case is retried, a second jury, without the misunderstanding, may reach a proper verdict; and additionally, [it] may reach a verdict without compromise of any kind," Memorex said in its motion.

"The judge's instructions led people to believe such a verdict would be improper. I believe a verdict would definitely have resulted if it had not been for the judge's instructions, because we had reached a tentative agreement about which acts were wrongful and had harmed Memorex in the most serious way. The tentative compromise we had worked out seemed fair and just; it was based on a careful evaluation of Memorex's strongest and weakest points," Johnson said.

Charley Smith, the juror who asked that Conti be asked the compromise question before they issued a verdict, was also one of the jurors who favored IBM. He had served on a jury in 1977 with another Memorex juror, Rockwood Adams, and according to Adams, in that trial the jury was split 11 to one with Smith differing from the rest of the jury, although he eventually changed his vote.

Several of the jurors were particularly offended when Conti found that the issues of the case were too complex to be understood and judged by a jury.

Although none of the jurors had a college degree and only one had any previous DP exposure, Bratovich said, "I don't believe a college education determines a person's ability to understand things. I was planning to go on to college . . . but the Depression hit and I didn't have the $200 I needed. It isn't right that because I grew up in that time and came from a poor family I shouldn't sit on this jury . . ."

Another juror, Cidro Rincon, "had no educational background" but did have a lot of work experience and general experience in many aspects of life. He claimed, "I have the ability to understand the case. A person exercising judgment and common sense regardless of educational background could decide the case."

Rincon has worked at the University of California for 16 years and was promoted to supervisor after eight months. "That was on my own merits. There was no Affirmative Action back then. I was the only Chicano; there were no black people. I was in charge of people who were college graduates and I am in charge of people who are college graduates right now . . ."

One of the most articulate statements by a juror came from Thelma Carey, who supported Memorex and whose husband and son are both lawyers. "As reported in the press, Judge Conti has stated 'that the Memorex-IBM lawsuit was beyond the ability and competency of any jury to understand and decide rationally.' As a juror on that case, I take exception to that remark and feel that Judge Conti has seriously underestimated the intelligence and competency of that jury. I feel I understood the case very well and most of my fellow jurors did also."

Thorough Mini Search Well Worth It

(Continued from Page 1)

for its Irbis configurations, Brunswick first appointed a selection committee composed of some of the company's top managers, who began their job by compiling a list of key evaluation criteria.

In the technical criteria category, the committee members stressed computer architecture, I/O capabilities, ease of programming, operating systems, expandability, reliability and physical environment. Support criteria included maintenance and serviceability, software support, vendor cooperation, warranties and training. Financial factors included vendor competitive position, risk factor, equipment costs, maintenance costs and applications programming costs, Mikusa said.

Bid Requests

With the main evaluation criteria defined, selection committee members requested bids from 28 vendors, 20 of which replied with proposals. After studying the memory capacity, language capabilities and other key features of each proposed system, Brunswick narrowed the field of competitors to seven prospective machines — a Burroughs Corp. B 80, Data General Corp. Micronova, IBM Series 1, Datapoint Corp. 1500, Honeywell Information Systems, Inc. Level 6 Model 23, Wang Laboratories Inc., WCS 15 and a System 400 from a subsidiary of Pioneer Electronics, Inc.

Subsequent evaluations reduced the list of prospects to three models — the Data General, Datapoint and HIS equipment.

Before making a final hardware selection, Brunswick invited the finalists to demonstrate their systems to a management team representing two of the company's divisions.

Although the competition proved close, Brunswick opted unanimously for the HIS equipment primarily because the Model 23, with its Megabus architecture, seemed better able to accommodate the company's planned hardware expansions than either of the other two finalists, Ulrich explained.

Incorporating 32K-byte CPUs, 250k-char. dual diskette units and 120 char./sec printers, the Irbis equipment at first will perform only bowling-league statistical and clerical functions like computing individual and team scores, compiling weekly individual and team standings, making lane assignments, monitoring player attendance and listing the addresses of all league members.

Enhancements Planned

This League Record Service capability, however, represents just one of several applications "modules" Brunswick eventually intends to add to the Irbis hardware, Ulrich explained. During the coming months, the company plans to enhance the system with point-of-sale and energy management modules, and by the first of next year the equipment will also perform standard business applications.

To date, the company has installed Irbis configurations at 16 Brunswick-owned bowling alleys. A 17th system will soon become operational, according to Ulrich.

At the few Irbis sites already operating, bowling alley proprietors have reported increased personalized sevice to their patrons, Ulrich said. For example, unlike manual control methods, the systems help employees identify bowlers who frequently miss league competition, and the hardware also helps proprietors find out how to contact those absent players, he added.

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ICA, TCA Tell Congressmen

Guidelines, Definitions Needed to Protect Users

By Edith Holmes
CW Washington Bureau

WASHINGTON, D.C. — Users recently praised the House Communications Subcommittee's efforts to rewrite the Communications Act of 1934 and asked for assurance that the legislative shift from regulation to competition won't harm broad user interests.

Representatives of two major user groups — the International Communications Association (ICA) and the Telecommunications Association (TCA) — appeared before the subcommittee during hearings on H.R. 13015 to testify that a failure to back the competitive thrust of the bill with specific guidelines and definitions could be detrimental to users and the general public.

The emphasis of the "Communications Act of 1978" on minimizing regulatory intrusion in the telecommunications industry "is an approach worthy of support," according to Robert E. Dennis, chairman of ICA's Regulatory Liaison Committee and director of telecommunications for the Westinghouse Electric Corp. But the new Communications Regulatory Commission (CRC), established by the legislation to replace the Federal Communications Commission (FCC), can't be expected "to place maximum feasible reliance on marketplace forces" without additional guidance from Congress on when "marketplace forces are deficient," he added.

Specifically, "It is imperative that a clear definition of the term 'noncompetitive service' be included in the bill and that guidelines for classifying a service as noncompetitive . . . also be provided," Daniel Grove, president of TCA, stated.

Users want to see the continuation of actions taken by the FCC in favor of competition in recent years, Bennis and Grove agreed. They would like H.R. 13015 revised to make certain no harm comes to the services now provided by specialized common carriers and that the flexibility and cost advantages users have gained through the FCC's terminal equipment interconnection program are affirmed, for example.

Urge Definitions

Neither ICA, nor TCA, which represent 388 leading manufacturing companies across the economy and the country and more than 850 telecommunications professionals on the West Coast, respectively, want a lack of definition in the bill to permit the CRC to regulate such previously unregulated telecommunications-related services as DP, Grove and Bennis stressed.

"We are convinced that user interests are best met by services such as these remaining unregulated," Bennis said of DP and data base service "packages."

The bill's use of the term "telecommunications" does not specifically exempt DP services. The CRC could decide that they are covered by its authority to regulate "telecommunications," Bennis noted. H.R. 13015 should state that services previously unregulated are to remain free of CRC supervision, he recommended.

A pivotal distinction is drawn in the legislation between "competitive" and "noncompetitive" services. But while these terms set the boundary for CRC regulation and responsibility, they aren't defined in the bill, Grove and Bennis pointed out.

Nowhere are degrees of competition discussed. "To assume that all users are protected because of the availability of some degree of competitive alternative is an assumption we think premature," Bennis said, noting that a fully competitive marketplace will best serve the user while a marginally competitive environment will not.

The arrival of the specialized carriers, for example, has meant options for the user which are important, not only in terms of the costs of service, but in terms of operational flexibility, Bennis stated. Competition from these new carriers has spurred the traditional carriers to offer improved and more diversified service as well.

If, under the bill as presently drafted, the CRC found the services provided by the specialized carriers are "competitive" because they offer an alternative to the Bell System and if, as a result, it withdrew its examination of rates and plans to add or end services, "competition" could prove "fatal" to that part of the communications industry and to users, Bennis warned.

Grove suggested the bill's substitution of the term "equitable" for the worn and familiar phrase "just and reasonable" to describe preferred communications rates could have a further unfavorable impact on users. The proposed law neither defines "equitable" nor offers guidance to its meaning, he complained.

"The desirability of discarding the present language is questionable and, in our view, the change is unnecessary," Bennis added.

The user groups also questioned the bill's plan to replace the procedures carriers must now follow to construct or extend their facilities with a simple notification process. While this approach may speed the introduction of technological innovation and new services, it may also provide the car-

(Continued on Page 6)

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IBM's Use of Microcode Marks New Direction

(Continued from Page 1)

works should shed some light on what it means to computer users and how the various 370-compatible vendors are reacting to this strategy.

Functions in Microcode

ECPS incorporates an OS/VS1 assist and a VM/370 assist. As its name implies, the OS/VS1 assist is designed to improve the performance of OS/VS1. To achieve that improvement, key functions of the VS1 supervisor were implemented in microcode. Those functions are invoked when the VS1 supervisor executes a machine instruction with a formerly invalid opcode.

The second byte of the instruction is a secondary opcode which designates which of the VS1 functions to perform. The VS1 supervisor was modified to add the machine instructions necessary to invoke the microcode routines.

At system generation time, the supervisor can be configured in one of three ways:

- With no microcode routine calls. Only software routines are included.
- With only microcode routine calls. Software routines corresponding to microcode routines are not included.
- With both microcode routine calls and the corresponding software routines.

In the first and third cases, the system can be run on any 370-type machine. In the second case, the system will only run on a machine that has the VS1 assist component of ECPS.

The VS1 component of ECPS on a 370/138 or 148 consists of 34 instructions (34 secondary opcodes), ranging from the simple STORE ECPS/VS1 LEVEL or SIO TRACE instructions, which emulate only a few software instructions, to the PAGE MEASUREMENT or SHORT TERM UNFIX instructions, which emulate hundreds of software instructions.

The VM/370 assist component of ECPS is designed to improve the performance of VM/370 and, indirectly, the operating systems that are executing in a virtual machine under VM/370. The VM/370 component consists of four components: Control Program Assist (CPA/VM), Virtual Machine Assist (VMA), Expanded Virtual Machine Assist (EVMA) and Virtual Interval Timer Support.

Control Program Assist

The Control Program Assist component (CPA/VM) is similar to the VS1 component of ECPS in that it consists of microcode implementations of key routines of the VM/370 control program. These microcode routines are invoked when the VM/370 control program executes a machine instruction with an opcode also formerly invalid.

The second byte of the instruction is a secondary opcode that designates which of the 19 VM/370 functions are to be performed. CPA/VM differs from the OS/VS1 component in that the machine instructions that invoke the CPA/VM functions are always included in the control program code. During initialization, the control program determines whether to use the microcode routines or the software routines. In addition to the 19 new instructions, CPA/VM performs the function of SVC 8 and SVC 12 when they are issued by the VM/370 control program.

The VMA component of ECPS is identical to the feature of the same name available on a 370/135, 145 or 158. It consists of microcode routines that perform the function of certain frequently used virtual machine instruction simulation routines of the VM/370 control program. For example, if OS/VS1 is executing in a virtual machine under VM/370, the execution of a LOAD PSW instruction causes a real privileged instruction program check because the real machine is always in problem state during virtual machine execution.

Without VMA, the VM/370 control program would handle the interrupt and perform the instructions necessary to load a new virtual machine PSW. With the VMA, the microcode simulates the instructions necessary for the loading of a new virtual machine PSW without causing an interrupt, thus bypassing the state preservation and restoration operations (such as saving and restoring registers) which are required for a software simulation.

Expanded VMA (EVMA) includes additional virtual machine instruction simulation routines and also includes routines that partially simulate the privileged instruction program check handler of VM/370 for instructions which cannot be handled by VMA because of special conditions.

LOAD PSW and LOAD REAL ADDRESS are typical of the instructions supported by either VMA or EVMA. When such instructions are executed by a virtual machine under VM/370, the microcode routines perform the appropriate function, providing certain conditions are met. If these conditions are not met, a program check is taken to let the VM/370 control program software routines handle the simulation.

Cornell is director of advanced features development at IPL Systems, Inc. in Waltham, Mass.

Cambridge Adds 370-Compatible CPUs

(Continued from Page 1)

printed circuit cards into the appropriate CPU chassis slots, a spokesman explained.

Although the processors borrow their design from IPL Systems, Inc.'s 370-compatible Omega 480-1, wide performance differences are said to separate the trio from their IPL relative.

While the Cambridge Memories machines compete with the low-end members of the 370 series, the Omega 480-1, which IPL manufactures for Control Data Corp., belongs to the 138-and-above performance class, the spokesman noted.

Among their other hardware features, the Cambridge Memories mainframes incorporate both emitter-coupled logic and current-generation TTL circuitry as well as 48K bytes of control storage expandable to 64K bytes.

The company currently bases its control storage on 1K-bit bipolar read-only memories (ROMs). Sometime during the first or second quarter of next year, however, the add-on memory supplier will replace those chips with 4K-bit ROMs and thus boost the processors' maximum available control storage to 512K bytes, the source predicted.

Because the processors are plug-compatible with their IBM counterparts, they offer no integrated communications adapters. Instead, they provide three classes of I/O channels — a byte multiplexer, selector channel and block multiplexer.

Each of the three models offers one byte multiplexer, which transmits data in one-byte segments to and from card readers, card punch units, printers and various communications controllers.

Each of the models also incorporates two block multiplexers, which accommodate direct-access storage units equipped with rotational position sensing. The selector channel, meanwhile, sends and receives data in byte streams to support high-speed disk and tape units, Cambridge Memories said.

Roughly the same size as their IBM counterparts, the plug-compatible mainframes will serve primarily as 370 replacements, modules in distributed processing networks and equipment solutions in "leading edge" applications.

A 256K-byte Model 1 costs $120,000; a 512K-byte Model 2, $185,000; and a 1M-byte Model 3, $265,000.

Deliveries of all three models will begin in mid-1979 from Cambridge Memories at 360 Second Ave., Waltham, Mass. 02154.

ICA, TCA Urge User Protection

(Continued from Page 5)

riers with an incentive to expand their recoverable rate bases unduly, Bennis and Grove noted.

"User reliance on particular services and service configurations will often involve substantial commitments in terms of design and other operational features which cannot readily or immediately be transferred to other carriers, even where some degree of competitive alternatives may exist," Bennis said.

The CRC's "broad mandate" to exempt carriers from any regulation or to impose alternative regulations different from those Congress has recommended should be "more narrowly defined," Grove stated.

He and Bennis agreed that the access charge the bill requires from those who connect their intercity telecommunications service to the telephone company's local exchange switching facility should only be collected from carriers.

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To Integrate Efforts

GSA Should Operate DP Support Units: Carr

By Don Leavitt
CW Staff

WASHINGTON, D.C. — Changes in the DP support available to government agencies have been proposed by General Services Administration (GSA) Commissioner Frank L. Carr, even before the federal DP reorganization study group within the Office of Management and Budget has published its final report.

In a July 28 letter to Assistant Secretary of Defense Fred P. Wacker, Carr urged that the Federal Computer Performance Evaluation and Simulation Center (Fedsim), the Federal Cobol Compiler Testing Service (FCCTS) and the Federal Conversion Support Center (FCSC) all be transferred to GSA's Automated Data and Telecommunications Service, which Carr heads, effective Oct. 1.

The Commissioner told Wacker that all three activities "operate in support of the DP procurement functions in the federal government" and all require similar skills.

Transfer of these activities to GSA "would better integrate their efforts with those of GSA in the ADP management and procurement function," he contended. "No similar purpose would be served by their transfer to [the Department of] Commerce," he added.

Furthermore, Carr said, the placement of these functions in GSA would be "looked upon with favor by the House [of Representatives] Government Operations Committee."

In his letter, the GSA spokesman contended that "Fedsim's efforts [now managed by the Air Force] are largely related to DP acquisition planning; Fedsim also has been delegated authority by GSA to review agency procurement requests for computer performance monitoring hardware and services."

FCSC — once officially backed by the Navy but now run essentially as an offshoot of FCCTS, itself a Navy-run operation — "would provide reimbursable services to federal agencies in a fashion similar to Fedsim where conversion planning, implementation of conversion plans or procurement of conversion services is contemplated by an agency," Carr reminded Wacker.

FCCTS currently runs under a delegation of authority from the National Bureau of Standards (NBS) "again in support of procurements," he said, pointing to the test routines developed and used by FCCTS to test vendors' compilers for compliance with the federal Cobol standard.

FCCTS earns one-fifth of its operating costs through the sale of validation software and services "primarily to the private sector," Carr noted, but the rest of the cost has been supported by the Defense Department.

He told Wacker, however, that the House Committee on Appropriations on the Defense Appropriation Bill for 1979 rejected a request for $939,000 for this activity. The committee's report said "this mission has been transferred to GSA and the funds cannot be used for that purpose,' " Carr said. To this he commented, "while the first part of that statement is in error, for the moment, the intention to eliminate this federal operations directorate" — apparently referring to FCCTS — "is clear."

Carr concluded his letter to Wacker with a suggestion that Secretary of Defense Harold Brown inform Rep. Jack Brooks (D-Texas) of the Defense Department's decision on the Carr proposal.

Dr. Paul Oliver, head of FCCTS (and, in effect, FCSC as well), acknowledged he knew of Carr's letter to Wacker, but Col. Dave Igelman, in command of Fedsim, said he was unaware of it.

Each man noted, however, that discussions of the best placement for their activities had been going on for some time. They agreed this seemed perfectly natural since the work they were doing was not directly related to the primary mission of their respective services.

DP Managers Honored in D.C.

WASHINGTON, D.C. — The Interagency Committee on Automatic Data Processing (IAC/ADP), a governmentwide organization that provides a forum for federal DP managers, recently presented several awards to individuals who have made significant contributions to the DP field.

The awards were given to Paul Oyer, from the Department of the Treasury; David Barefoot, from the Association of American Railroads; and Lt. Col. William T. Bennett Jr. of the U.S. Air Force Data Automation Agency.

Oyer received the award for his work as the 1976-78 president of the Federal ADP Users Group (Fadpug), a volunteer organization of DP managers and senior technicians; while Barefoot was selected because of his development of *Guidelines for Writing Computer Procurement Support Documentation.*

Bennett's award is based on his efforts to establish and operate the Data Systems Evaluation Office for the Air Force, a spokesman explained.

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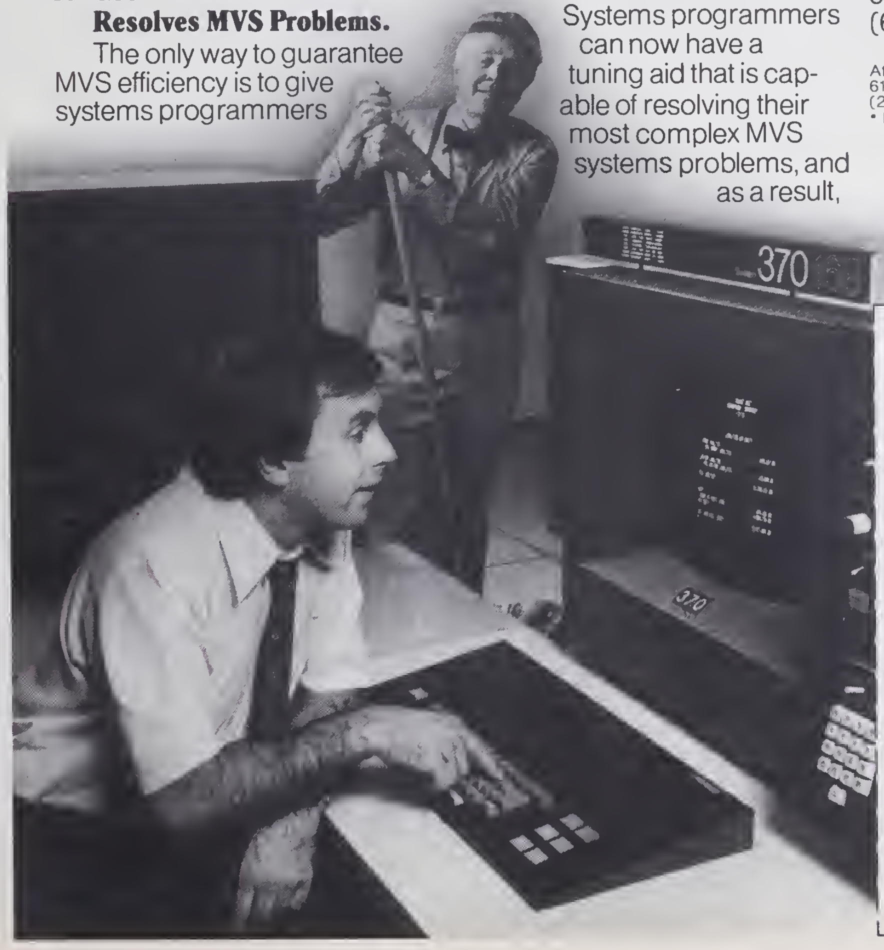


Industry Groups Attack U.S. Position Paper

(Continued from Page 1)

relies on a regulatory structure, complete with a license and registration scheme considered onerous by the U.S. This model also assumes total control by each nation over personal information on its citizens and in its files, Fishman said.

Adapso believes the U.S. needs to take the lead by supporting international legislation that would provide uniform transborder data flow and privacy protection standards, according to Philip C. Onstad, the association's International Data Communications Committee chairman. The U.S. should "encourage the enactment of legislation in each country which uniformly stipulates specific required and prohibited actions," he explained.

Fishman told the meeting of the Public Advisory Subcommittee on International Data Flows, at which Adapso and Cbema raised their objections to the Stockholm effort, that the U.S. paper served to crystallize the OECD group's discussion of the guidelines drafted by Swedish computer law expert Dr. Peter Seipel.

Seipel's guidelines made no attempt to find the middle ground between the European omnibus approach to privacy and the U.S. view that privacy protections should fit the abuses peculiar to specific industries, Fishman noted.

"The Europeans have a clearer idea of where the U.S. stands," the NTIA official said, adding that the paper pointing out the fundamental differences between the Americans and Europeans in the area of privacy found sympathy from the Canadians, the British and the Australians.

As a result of the U.S. paper and the discussion that followed its presentation, Sweden, France, Austria and Germany agreed with the U.S. and its sympathizers that the Seipel draft should be rewritten and debated again at the next meeting of the OECD group in December, Fishman stated.

The U.S. paper supported the principles of personal data protection that are embodied in the Privacy Act of 1974. It further advocated the continued free flow of information across borders as a goal to be facilitated by the OECD guidelines.

Voluntary Code

Fishman warned the Europeans that the U.S. probably won't establish a federal privacy board with statutory powers. He did suggest, however, that a voluntary code of conduct might be accepted by U.S. Companies and private institutions that would assure concern for an protection of European personal data in this country. Swedish representatives seemed particularly receptive to such a voluntary code, he told the advisory subcommittee.

The U.S. asked the European governments "to avoid the unjustified disruption of international trade patterns and the creation of nontariff trade barriers with respect to transborder data flow." The paper also urged nations to "refrain from restricting the import and export of data unless doing so is essential to the protection of vital national interests."

Adapso contended the U.S. should have approached the Europeans with a plan to require the registration of personal data files with government agencies in the individual countries and methods for publicizing the existence of those files, to permit individual access to them and correction of erroneous or incomplete data.

The association's chief concern is for multinational corporations whose operations today face "a myriad of licensing, registration, notification and inspection requirements" as a result of the several national privacy laws, Onstad said.

'Impractical' Proposal

Fishman expressed surprise, however, at what he viewed as the sudden eagerness of U.S. companies for registration requirements. Calling the Adapso proposal "utterly impractical," he told the association it would not be able to divert the Europeans from their omnibus approach to privacy.

The nations on the other side of the Atlantic Ocean will receive international registration proposals with warmth, though, he added.

Europe perceives that privacy abuses have occurred, Fishman said. "I am convinced that Europeans are genuinely concerned about the privacy of their citizens and they are particularly sensitive when the data on their people is processed in the U.S."

The NTIA official predicted that there will be two international efforts on transborder data flows. One, from the Council of Europe, will be binding on the nations who sign the agreement and will specify the interactions between countries on privacy matters. The other will be from the OECD, whose guidelines won't represent anything so strong as a treaty.

"There is a growing resignation in Europe that the U.S. simply won't be brought into the fold on questions of privacy," Fishman said.

The importance of the OECD guidelines and U.S participation in their formation stems from the basis they will lay for the acceptance of nonstatutory assurance that European citizens will be protected in countries like the U.S., State Department official Morris Crawford told the companies attending the advisory subcommittee meeting.

A representative from Citibank picked up on this point, suggesting that his multinational firm views the OECD guidelines as an entree for negotiations with each country with which the financial institution does business. "It will be a long time before an international agreement or treaty is developed. By then, we will have adapted to each nation's laws," he said.

Fishman said he believes the OECD will have guidelines on transborder data flows and privacy protection by this time next year.

Datapoint System Operates Under ARC

(Continued from Page 1)

Supporting the user memory within the 1800 are 4K bytes of read-only memory (ROM) for system software and up to four dual-drive diskette modules. Using dual-density diskettes, each module can store up to 1M byte of information, providing a system maximum of 4M bytes of on-line storage.

The 1800 is said to be compatible with nearly all Datapoint peripherals including line, belt and matrix printers; magnetic tape units; and modems.

The built-in communications interface permits auto-dial and auto-answer operations under synchronous, asynchronous, bisynchronous and Synchronous Data Link Control (SDLC) protocols, the spokesman said.

Datapoint's Multilink language may be used for real-time communications with a remote host CPU allowing tasks that, for example, require processing a remote data base. The 1800 can also be used in Datapoint-to-Datapoint networks using the Datapoll package. With it, programs can be down-line loaded to allow central control of remote operations, Datapoint said.

The 1800's display memory is programmable, allowing the generation of 128 different characters in an 80-column-by-24-row format. The CRT can display inverse video (dark characters on a light background) on a character-by-character basis.

Blinking and split screen displays are also available for more effective operator prompting, the spokesman added.

Keyboard Features

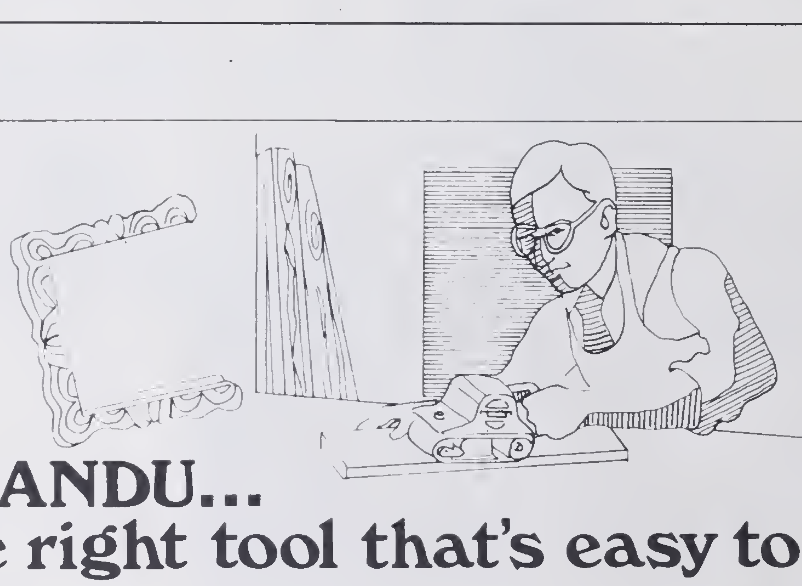
The processor keyboard provides a full set of upper- and lower-case and special characters and is organized in standard typewriter layout. An 11-key numeric pad is included as are five processor control keys, he said.

The system supports batch-oriented ANS Cobol as well as the interactive implementation of the language. Otherwise, Basic, Basic-Plus, RPG-II and Databus programs may be written, compiled and executed on the 1800.

Datapoint's DOS for the new processor is comparable to the system software already available on the company's other CPUs. Most of the utility and application packages running on other Datapoint gear can be moved to the 1800 without reprogramming, unless the user wants to utilize a new facility such as the inverse video display, the spokesman added.

The 1800 (without peripherals) can be purchased for $12,700 or leased for $377/mo under a three-year agreement. Maintenance costs $124/mo.

The million-character diskette modules cost $4,100 each, while the three-year lease rate for each additional module is $115/mo, Datapoint said from 9725 Datapoint Drive, San Antonio, Texas 78284.



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N.Y. Assemblyman Faults HRA

Welfare Fraud Detection Program Called Weak

By Marguerite Zientara
CW Staff

NEW YORK — Brooklyn Assemblyman Charles E. Schumer has leveled new criticisms against the computerized federal program to reduce welfare fraud [CW, June 5]. Run by the Human Resources Administration (HRA) here, the program "has the capability to ferret out the individuals on the rolls with the highest statistical likelihood of fraud for priority investigation, but has not used it," he charged.

Schumer made his remarks at a news conference held at the New York State Office Building here on Aug. 3. He said he got his information from HRA printouts supplied by sources "frustrated by the agency" and who "had no faith that HRA would follow up on these printouts."

However, HRA spokesman Lloyd Lochra called the criticism "quite unjust" and said, "I do not believe he [Schumer] understands the system and I believe he is misconstruing a lot of the information he does have." The Department of Health, Education and Welfare (HEW), designer of the matching system, "cited our matching program as the model for the nation," another HRA spokesman pointed out.

Duplicate SSNs

In making his charges against HRA, Schumer revealed the existence of 4,000 duplicate Social Security numbers (SSN) belonging to welfare payees as well as the fact that 60,000 individuals are on welfare without SSNs. He charged that it is illegal for someone to receive welfare in either case.

Lochra, who acts as assistant commissioner of process and management control, defending HRA's program, admitted there are 60,000 records in the system without SSNs, but said that of those 60,000, only 6,000 are payees. The other 54,000 are children under the age of 18 who are dependents of payees, he noted.

Schumer contended the records of the dependents should be checked "to guard against fraudulent abuse of their names by adults." Lochra said the HRA is working with the Social Security Administration (SSA) "right now" to get SSNs for those without them. "Until less than two years ago, we weren't required to carry SSNs for children and we did not. At that time, we had fewer than 10,000 numbers for dependents."

Since then, he added, HRA has gotten more than 800,000 cases for children enumerated and validated to the point where 87% of the dependents listed have been validated.

As for the 6,000 payees without SSNs, they comprise a constantly changing pool of people who are in the process of getting SSNs, according to Lochra.

Joint Effort

As part of HRA's "constant, ongoing program" with the SSA, he explained, if a welfare applicant doesn't have an SSN, HRA will get one for the person and then validate it with the SSA.

"We put a flag on each validated record and the date that it was validated; they are validated again and again," he said.

Schumer suggested HRA should follow a "simple antifraud procedure" like the one in Los Angeles. In that system, Schumer said, when one applies for welfare, he must present an SSN which is checked with the SSA for validity and with the HRA for duplicity before the applicant receives welfare.

If the applicant does not have an SSN, as is the case with many children, he should be put on the welfare rolls for a provisional period. If the applicant does not present the SSN during that time, his welfare eligibility should be terminated automatically by computer, Schumer contended.

The HRA does not have such a program, Lochra said, because "it is not at all a federal regulation and it is a federal program that we're running." He said that only in the last one or two months has the federal government required SSNs from everybody in the program, even though the HRA has been requiring them for "several years."

Lochra noted that because of recent problems at SSA "in terms of its data base," SSA has implemented new procedures for getting an SSN. "Whereas in the past, it took one or two days to get one, it now takes more like a month," he said.

Nationwide it is now a much slower process, Lochra said, partly because of a "fairly substantial" clearance procedure to prevent people from having two or three SSNs. "We were running up against that problem very strongly," he noted. "They would issue 'replacement' and then 'replacement replacement' SSNs, none of which were ever cancelled on the file so they all showed as valid numbers."

Once the HRA gets an SSN for an applicant, it then takes four to six weeks to validate the number "because we have to send a large computer file down to Maryland, where it is matched and sent back. Then we have to analyze it," Lochra explained.

Lochra also claimed that HRA's data base contains "more than one million" active clients and that "98% of all our payees have validated SSNs."

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Military Agrees With Critique of Pentagon DP

By Brad Schultz
CW Staff

WASHINGTON, D.C. — The Office of the Secretary of Defense and the Departments of the Air Force, Army and Navy largely agree with the recent federal DP reorganization project report that criticized Pentagon DP management.

John Carabello, Department of Defense (DOD) director for data automation, agreed with the report's recommendation that Pentagon DP operations and acquisitions be made more accountable to his office under the assistant secretary of defense (comptroller).

The report found this office lacked the authority and the necessary resources to monitor Pentagon activities; to expedite the "interchange of systems, materials and information among DOD computer services"; to work as the interface between DOD and other federal agencies, including Congress; and to assign responsibilities to DP personnel [CW, Aug. 7].

Carabello also agreed that most U.S. military computer facilities are equipped with hardware and software "years behind" private-sector facilities, but stressed a distinction between "obsolescence" and being behind the state-of-the-art.

To stay ahead of "the power curve," the nation's armed forces may not need the very latest in DP goods, he explained. "Extending the lifetime of an installed [DP] base" is also worthwhile economically, he added.

Department of the Army management also generally agreed with the report, according to John F. Wallace, deputy for management systems under the Army's assistant secretary for financial management.

The report stated that the Army "does not have the quantity or quality of officers required to adequately staff the program offices charged with development of tactical systems" and blamed this in part on "the lack of a DP career field for officers."

Need for Career Management

"The problem is even broader than that," Wallace said. "Frankly, we don't have a good career management system for our officers in the DP area." However, a three-person board under a new Army assistant chief of staff (AACS) will be devoted to creating such a system.

The Army has also been reassessing its "go-to-war" capability in terms of DP and agrees with the report that there may not be adequate support for critical systems, Wallace noted.

He took some exception to the report's charge that Army DP is too concentrated in the highest command levels and that more DP expertise and resources should be delegated to sub-Corps (field command) levels.

"You can't have it both ways," Wallace remarked, noting that although the Army tries to vest as much responsibility as possible in its lower officer grades, certain capabilities — such as tactical DP — are best managed further up the chain of command.

As for the Navy, the report said its top management scarcely seems to realize how dependent this branch of the military is on its DP resources.

'Well Aware'

The Navy's formal response to this charge was that "most Navy managers are well aware of their dependence on computers.

"However, the Navy strives to make computer support transparent to the users so that, when everything works smoothly, they have no need for constant preoccupation with computers."

The report charged that Navy management is not sufficiently involved in DP decision-making and that where it is involved, the managers are generally inadequately trained.

The response contended that the "Navy insists that every DP project have functional manager support at the highest level. Computers are considered essential tools in mission accomplishment. Navy managers are experienced in dealing with projects which are dependent on computers."

The report said only about 5% of Naval officers with the rank of commander "have some DP special skill." This figure drops to 3.1% at the next highest rank (captain) and few admirals have any DP experience.

The Department of the Air Force noted some agreement with the report, but stated the authors may have been misled by a few "atypical" cases of Air Force DP problems.

Concern Over Turnover

Its response did note the turnover and exodus of data automation people." The department said, "This is a difficult problem because the Air Force must compete with the private sector for a scarce and valuable skill.

"Notwithstanding the difficulty of this problem, we are committed to improving and strengthening the data automation career field through career broadening and management development."

Washington to Host Fall EFT Conference

WASHINGTON, D.C. — The Electronic Funds Transfer Association (EFTA) will hold a forum here Sept. 24-26 to discuss the impact of current federal legislation on EFT systems.

Speakers scheduled to participate include Lewis Taffer, assistant counsel of the U.S. Senate Subcommittee on Consumer Affairs, who will discuss the Riegle bill; James McMahan, counsel of the House Subcommittee on Consumer Affairs, who will review the Annunzio Bill; and Philip Manuel, staff of the U.S. Senate Subcommittee on Permanent Investigations, who will field questions on the computer security bill sponsored by Sen. Abraham Ribicoff (D. Conn.).

The Communications Act of 1978 will also be reviewed and questions answered by representatives of AT&T.

The forum is open to association members and guests on a first-come, first-served basis, a spokesman said. Information and registration forms are available from EFTA, 1312 18th St., N.W., Washington, D.C. 20036.

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Courses are listed according to subject material. Each listing includes the appropriate sponsor's address and telephone number.

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At Boston Edison, Gas

Utilities Use Billing Audits to Catch Thieves

By Tim Scannell
CW Staff

BOSTON — Massachusetts utility companies are using computers, paid informants and specially trained "strike teams" to crack down on the thousands of residential and commercial customers who try to beat each firm's billing system by tampering with the gas or electric meters.

However, even though the increased policing efforts have meant the recovery of hundreds of thousands of dollars, energy theft is still rampant and, for the most part, an elusive problem.

In fact, during 1976 and 1977 the utility companies lost an estimated $20 million in eastern Massachusetts alone because of illegal energy consumption, an industry representative said.

Out of the approximately 550,000 customers served by Boston Edison, anywhere from 2% to 10% of them might be energy thieves. "We've had about 2,000 cases this year where we are absolutely sure that the meters have been tampered with and the current diverted and stolen. But there could be five, 10 or even 15 times that many cases out there that we have not yet discovered," Harriet Stanley, a Boston Edison spokeswoman, pointed out.

Several Approaches

There are several established ways of catching a utility thief. One way is following up tips from informants, Stanley explained. Boston Edison gets an average of one tip a week on a residential customer and usually pays such informants $25 per valid tip.

Still another, very effective method of uncovering an energy thief is through automatic computer billing audits, Stanley said. Boston Edison has an IBM 370/158 mainframe with 2M bytes of memory which is programmed to isolate unusual surges or drops in power usage.

There is an established usage pattern for each residence, she explained, and if that usage drops down to only 10% or 15% of the normal rate than "it may be that the record would kick out of the computer."

Of course, the following month the usage level may return to normal, she continued, "which probably means that person was on vacation or something. But, if the usage drops down and stays down, then we become interested.

In the case of a business customer, a difference in the level of usage is particularly noticeable, Stanley said. For instance, she quipped, "You can't cook donuts in a bakery without using energy for your stove and hot grease."

A third method has been to train meter readers to spot possible tamperings, and that doesn't only mean examining the seal, but peering into the meter and looking at things," Stanley explained.

Losses Thus Far

Thus far, she continued, Boston Edison has recovered $432,000 in the last 12 months through in-court and out-of-court settlements and it documented losses of $1,035,000 in 1977 alone.

A number of these people have diverted large quantities of electrical current, so they're causing everybody to pay considerably higher rates," Stanley said. She cited the case of one suburban commercial customer who was ordered to pay $120,000 to Boston Edison in an out-of-court settlement.

Identifying utility thieves is also a "priority item" at the Boston Gas Co., according to James Tobin, supervisor of claims in the Legal Services Department.

However, most frauds here are discovered through extensive "foot work" and field investigations rather than computerized sleuthing. "We'd like to catch more [frauds] through computer audits" Tobin stated. "I don't feel the computer catches fluctuations in consumption the way it should."

Boston Gas also uses an IBM 370/158 with 2M bytes of memory for its financial and accounting functions but the system's "detective" capabilities are limited because of its programming.

As it is presently programmed, the system will allow an account to go unchecked for months, Tobin noted, even though the user's consumption may have dropped off drastically.

In one case, a commercial customer's usage rate for one month dropped from the $2,000 to $3,000 level down to $7.55. The discrepancy, Tobin stated, wasn't discovered until a sharp-eyed meter reader noticed the meter's dials had been manipulated.

Tampering with meters is not necessarily limited to physically breaking the company's seal and altering the clock-like dials, Edison's Stanley said. "We have actually prosecuted someone known as 'the fixer' who was a master electrician and could fix the dials or change the hands on the dials in perfect sequence so it was really tough to detect it."

Electricians have also illegally installed resistors on the company's meters, she noted, and many have hidden their "work" by resecuring the meter with stolen seals — a problem Boston Edison has not yet been able to deal with effectively.

Seal inventories are becoming stricter at Edison, Stanley said.

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Schaefer, EDS Both Faulted for Failure of FM

By Howard A. Karten
CW Staff

NEW YORK — When the F&M Schaefer Brewing Co. turned to Electronic Data Systems, Inc. (EDS) of Dallas several years ago to provide facilities management (FM) service, it did so because of difficulty in meeting its needs with its own department. The in-house department itself was inadequate, and DP management was ineffective and unresponsive to the company's needs, according to Dick Brandon, president of Brandon Consulting Group, Inc.

EDS was selected to provide this service partly because a Schaefer board member worked for the same company that had arranged the underwriting for both Schaefer and EDS, Brandon claimed, adding that this board member said, in effect, "We're working with an outfit that's expert in this business, that has hundreds of customers and is making millions of dollars. Why don't I arrange a meeting between the two board chairmen?"

This is the last of a three-part interview with Dick Brandon about facilities management and its dangers for users.

This is a perfectly normal way of doing business, Brandon declared, adding, "God knows I would like to have contacts at every boardroom in America. I would sell a lot of work, too. There's nothing wrong with that; it happens all the time."

However, as a result, Brandon said, Schaefer did not adequately check the references EDS could have supplied. "I don't think you're going to find the board chairman of Schaefer saying to EDS president Ross Perot, 'Hey, give me some references I can check,' when he's already got a reference of the highest recommendation from his own board."

Brandon added that in selling its services, EDS did not stress references obtained from other clients.

This charge was vehemently denied by Ed Marquez, a vice-president of EDS. "In every single sale after EDS' first, references were key. Trying to sell FM services without references would be like trying to play basketball without a basket. [References] are fundamental to the business. Anyone who's tried to sell FM services for 30 seconds knows that."

Approach to Personnel

Another charge Brandon leveled against EDS was that the company wished to discharge the DP personnel that had been employed by Schaefer.

Marquez denied this too, stating that EDS policy was to offer jobs to every person working in DP at a customer account and that the company strives not only to employ them at "the same basic level of compensation" (including salary and benefits) but also "works very hard to bring their technical skills up." Furthermore, Marquez said, in the Schaefer case it was "a matter of public record" that the Schaefer employees were asked and encouraged to stay. However, he said he was unable to comment on all aspects of the activities between the two companies since the events occurred too long ago.

In any case, Schaefer can be faulted in several respects for its performance under the contract, according to Brandon. Among the company's mistakes were "not having an intelligent contract [and] acceptance procedures, having essentially an EDS-designed contract, not controlling the operation and not demanding the right to say, 'Wait a minute, this is a low quality system and we're not going to accept it.'

"Schaefer had no rights and a lot of faith, and in effect, it was conned into assuming the facilities manager would act in the best interests of Schaefer," he claimed.

However, Schaefer — like any company — could just as easily have failed in this way with its own internal DP organization, Brandon added.

Irrigation Control Project Under Way at Iran Farm

By Ivan Berenyi
Special to CW

LONDON — A farm in Iran has begun installation of a computer-controlled irrigation system believed to be the first of its kind in the world.

The system at the Dasht-e-Naz farm near the shoreline of the Caspian sea will remotely control 51 kinds of wells and almost 50 miles of irrigation pipeline. It was designed by Nippon Electric Co. (NEC) of Japan under contract to the Iranian Ministry fo Energy.

Twenty-eight of the wells are conventional irrigation wells used to tap the water table for crop feeding, and 14 are observation wells, used to monitor the condition of the water table. Nine are injection wells, which are being used in an experiment to prevent the encroachment of brine from the salty Caspian Sea on to the farmland.

"During the summer dry season, a great volume of groundwater is pumped out to the farm," NEC spokesman E. Takeuchi explained. "This induces lowering of the water table and, as a result, allows the Caspian Sea's brine to penetrate into the ground and mix with the ground water. As a consequence, production wells on the farm have fallen into disuse.

"The antibrine system, of which this is the first in the world, prevents permeation of the sea water by forming an artificial watershed. This is achieved by injecting fresh irrigation water into the ground from the nine wells which are to be dug parallel to the shoreline of the Caspian, about three kilometers inland.

"The injection pressure and the quality of the fresh water are to be monitored and remotely controlled from the control room," Takeuchi said.

The system will consist of a central station equipped with a NEC 48K-word CPU, CRT, 2.4M-byte magnetic disk unit, digital plotter and conventional I/O devices. It will communicate with five repeater stations that will themselves be linked by private cable with the 51 well terminal stations.

Each terminal station will have a telemetry/telecontrol unit linked to flow measuring sensors, pressure measuring devices, instruments for measuring conductivity and chloride ion levels and butterfly and gate valves for controlling output.

The system will begin operation later this month and should be fully commissioned by March.

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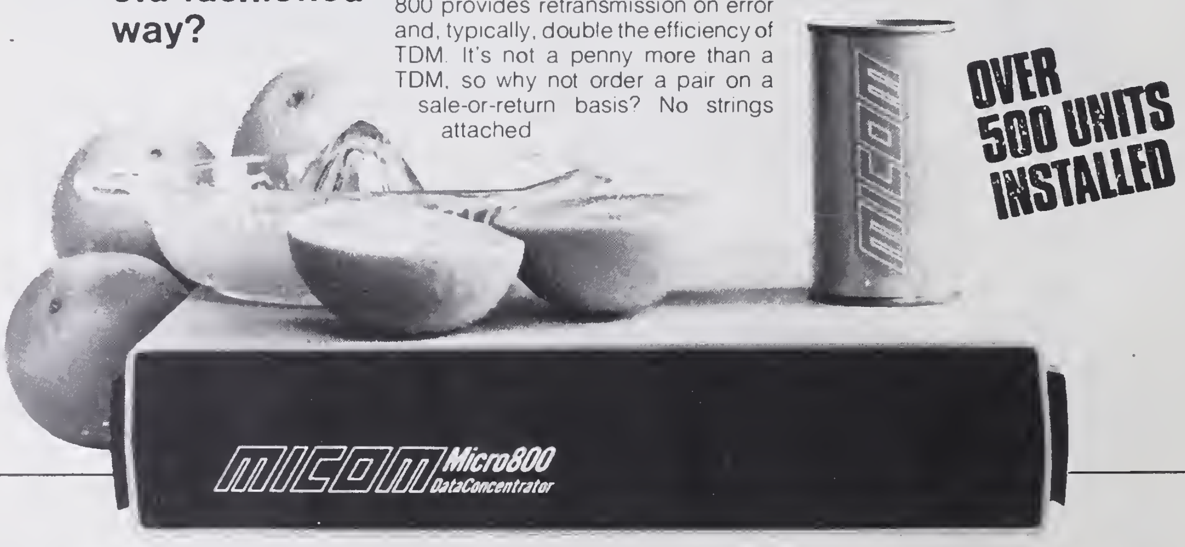

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User Disagrees With Brandon Criticism of FM

By Howard A. Karten
CW Staff

NEW YORK — Steven Manheimer, a facilities management (FM) user, feels Richard Brandon's charges about the drawbacks of this type of DP service are "outrageously broad or meaningless, at least in our experience."

Manheimer is president of J. Manheimer, Inc., an importer of raw materials whose DP operations are managed by Memcomp Systems, Inc. of Flushing, N.Y.

"If [as Brandon charged] we were getting minimal service, we would immediately be looking for someone else [to provide an FM service]," he said. In addition, Manheimer felt it would be more difficult for his small business to discharge a DP employee who was not performing adequately: "We might be a lot more lenient and a lot less objective" about discharging such an employee, Manheimer claimed.

Manheimer's initial experience with running its own DP shop was unsatisfactory. Prior to mid-1974, the company used manual systems. It then installed an IBM System/3 Model 6, based at least partially on recommendations made by the vendor, according to Manheimer. In the approximately 18 months the company ran its own small installation, the company had problems often experienced by larger shops: extreme cost overruns, the need to schedule overtime and an inability to respond quickly to developing needs.

Manheimer attributed some of these to his company's lack of familiarity with computers. "Since we had gone directly from manual systems to computers, we were slightly confused," he admitted. Another reason might have been the company's lack of desire to put its full efforts into learning how to mange with a computer. "We are primarily specialists in our field. We really do not care to be involved in managing a computer department, which is a specialty in itself."

Used Consultant

Much of the orginal software installation and customized programming had been done by Anthony Memoli, an independent consultant and president of Memcomp Systems, Inc. A year after he installed the software, Memoli was called back by Manheimer to perform changes Manheimer's own employees could not. In discussions with Manheimer's treasurer, Memoli learned of the company's dissatisfaction with its computer system and, although he had no experience in running an FM business, agreed to provide those services.

Responding to what he terms "incorrect charges," a facilities management user refutes statements made by Richard Brandon.

The result has been admirable in all respects, Manheimer feels. The contract with Memcomp, which has already been renewed once, calls for Memcomp to provide virtually all services Manheimer feels it needs. The prime limitation on the contract, according to both Memoli and Manheimer, is that there is a limit to the number of projects ongoing at any one time. Beside this, the company virtually has carte blanche to ask for whatever it wants. "So far, we haven't reached a point where we've suggested something and it wasn't completed satisfactorily. And modifications are made with a smile, generally, the way I see it."

Stating that his company did not have the expertise to manage its own DP function and did not wish to pay the price of acquiring its own, company-run department, Manheimer several times compared an FM vendor's expertise to that of a doctor or accountant. "He's a specialist in an area, and we have to make it clear what we want," Manheimer said of Memoli.

Manheimer conceded, however, that he was speaking from his perspective as president of a small business and that Brandon's remarks might apply more aptly to a larger company. J. Manheimer, Inc. is neither capable of nor interested in running a computer department, Manheimer said.

In addition, it is a mistake in judgment for a small or medium-sized business, particularly one devoted to technical subjects, to become involved in running its own DP department, Manheimer added. "It has neither the expertise nor the time, and it is extremely costly.

"There may be certain types of organizations and certain size companies that must have their own departments, but Brandon's remarks seemed a condemnation of the entire concept; and I must say, we are rather pleased."

As a result of his company's experiences with both types of DP service — in-house and purchased — Manheimer is convinced it has chosen the proper route. "We're buying this service like we buy any kind of service. It's a fiduciary relationship, and if it's not performance-oriented, that is management's fault.

"This is a professional relationship, and as long as it maintains its integrity, we'll continue to use it," Manheimer concluded.

Bank Uses Satellite To Kick Off Service

STILLWATER, Okla. — First National Bank & Trust Co. recently set a new high in automatic banking.

During the week in which the bank introduced its six "Pockets" automatic banking customer service units, on-line transaction information was relayed to the bank's DP center by way of the orbiting Westar communications satellite. First National Bank customers who used Pockets during that week were setting precedents by being among the first to have their banking transactions authorized and confirmed in a couple of seconds after a journey of tens of thousands of miles through space.

When a customer activated the automatic teller, the terminal control unit (TCU) was called. The TCU then utilized land-based lines to call the earth beaming station, which in turn signalled the satellite. The satellite then sent the information to the earth receiving station which, again using land-based lines, communicated with the data center where the customer's files were checked. The reverse route was used to transmit the transaction authorization.

First National Bank & Trust Co. retains the National Sharedata Corp. data center in Oklahoma City for its DP services. National Sharedata is an affiliate of Western Union, which owns and operates the Westar satellite.

The interconnection with the Westar satellite during the introduction of Pockets was an effective way to kick off the program, a bank spokesman said. It demonstrated that personal electronic banking can be immediate and available on a coast-to-coast basis.

It was with a view toward the same kind of availability for its customers throughout Stillwater that First National Bank established its network of six on-line automatic banking installations.

The First National Bank's on-line banking system is equipped with Diebold, Inc. automatic tellers and a Diebold TCU.

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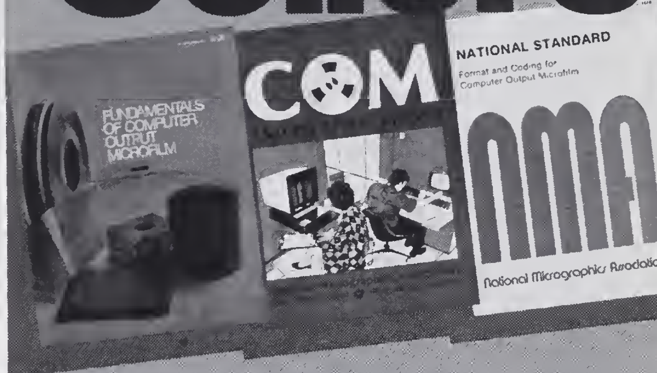
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Washington Update

Darby to Head FCC Bureau

By Edith Holmes
CW Washington Bureau

WASHINGTON, D.C. — Dr. Larry F. Darby has been named chief of the Federal Communications Commission's (FCC) Common Carrier Bureau, effective Aug. 31.

Darby, who has been serving as acting head of the bureau since mid-July, is replacing Walter Hinchman, who announced his resignation as bureau chief to establish a consulting business in the Washington, D.C., area.

A senior economist with the Office of Telecommunications Policy when he joined the FCC in March 1977, Darby was chief of the Economics Division of the Bureau when he was asked to act as the common carrier operation's head, a spokesman for the commission said.

The Mooreland, Ind., native received his B.S. degree in 1962 from Ball State University and his Ph.D. in economics from Indiana University in 1969. He has been an assistant professor of economics at Temple University, Philadelphia; a research fellow at Old Dominion University Research Foundation, Norfolk, Va.; and an economic consultant in Philadelphia and with the Prairie Provinces Cost Study Commission, Saskatoon, Saskatchewan, Canada, the spokesman stated.

Darby has inherited a number of key projects facing the FCC right now, among them the Second Computer Inquiry [CW, July 24].

Pengov to Lead Impact Study

Another key appointment has been made this summer. Dr. Ruann E. Pengov has accepted the Office of Technology Assessment's (OTA) request that she head its study of the impact national information systems have on society.

With an M.S. degree in mathematics education and computer and information sciences and a Ph.D. in public administration, both from Ohio State University, Pengov has been a congressional fellow with OTA, working in the advisory body's program on health. Before coming to OTA, she served as director of the Division of Computing Services for Medical Education and Research at Ohio State's medical school.

Pengov has done systems programming at Ohio State and for TRW Systems in Redondo, Calif.

As project leader of OTA's "Assessment of the Societal Impacts of National Information Systems," which was commissioned by Congress last April, Pengov will direct the organization's study of electronic funds transfer, electronic mail systems and the Federal Bureau of Investigation's National Crime Information Center.

Privacy Board Cut From Plan

Whenever they find their way to President Carter's desk in the Oval Office, the recommendations currently being drafted by the National Telecommunications and Information Administration (NTIA) on how the nation should approach the protection of privacy won't suggest the creation of a federal privacy board.

Sources close to the effort at NTIA indicated the group has dropped the Privacy Protection Study Commission recommendation that some "federal privacy entity" with statutory powers be established to oversee the implementation of privacy principles in the federal government and the private sector.

An office within NTIA might be established, however, to serve as a clearinghouse for domestic and international privacy concerns, the sources said. Such an office would only be created if it is not predicated on having statutory or coercive authorities, they added.

In this era of trimming the federal bureaucracy, few proposals recommending the creation of yet another body succeed against the White House desire to reduce government spending and balance the federal budget, the sources stated.

Consisting of 171 pages of text and a 38-page appendix, the draft of the proposed Administration privacy stance is currently being circulated among Cabinet members. Assistant Commerce Secretary and NTIA head Henry Geller

(Continued on Page 15)

PDP-8E, 11/04, 11/34, 11/35, 11/45, VT50, VT52, VT71,
VT61/t, RP04, RP05, RP06, RK05, RK06, RX01, 11/04, PRS01, LA36, LA 180, MF11U, MM8E, 11/34, 11/35,
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CW 828

As Cost, Time Savers

More Unique Zips, Mail Bar Coding Suggested

By Marguerite Zientara
CW Staff

CLEVELAND — Many of the U.S. Postal Service's financial and delivery-related problems could be solved by issuing unique Zip Codes to individual businesses and by computerized scanning of barcoded Zip Codes on envelopes for electronic sorting, according to Dr. James Rawlings Sydnor, a longtime observer of mail mechanization.

Writing in the July issue of *The Journal of Systems Management*, published by the Association for Systems Management (ASM), Sydnor contended if the Postal Service were to implement the above suggestions, "business mail would move faster, less expensively and would not be missent as often."

A unique Zip Code is a five-digit mail code assigned solely to a major institution, utility or corporation whose enormous mail volume warrants this special allocation, according to Sydnor.

Unique Zip Code holders enjoy preferential treatment, especially in the sorting of incoming mail, Sydnor wrote. "These privileged addressees receive capital and information sooner than a business which shares a Zip Code with other firms," he noted.

With a unique Zip Code, a business can capture its letters at the primary sortation. This saves the time required to sort the letters to the box section and hundreds of phantom boxes a business might rent.

Since the unique Zip Code is advantageous to businesses and the Postal Service, one wonders why more have not been assigned, he said. The answer goes back to July 1963, when the Zip Code was inaugurated, offering a total of 100,000 discrete numbers.

While that reservoir was more than enough to supply each of the then-existing 34,000 post offices with a separate number, it was not enough to provide all large mailers in major cities with separate codes, Sydnor explained.

Sydnor suggested the Postal Service enlarge the Zip Code bank by adding two or four digits to the five-digit zip code. Adding two digits would yield 10 million codes, enough for all major businesses and institutions, Sydnor said. Adding four digits would provide one billion numbers, enough for the approximately 76 million addresses in the U.S. Postal system as well as a surplus 924 million numbers for "flexible future assignment and adjustment," he noted.

According to a 1977 report by the Congressional Commission on Postal Service, 80% of all first class mail today is business-related. Therefore, Sydnor believes, "the first and [most] immediate entry point" into the enlarged Zip system would be the assignment of a unique Zip Code to each business in the country.

The success of this system would depend, Sydnor said, on the widespread introduction of bar coding to eliminate manual reading and keypunch mail sorting, which presently produce a 2.2% volume of missent mail, according to a recent survey.

In Atlanta, Ga., where bar code reading equipment is installed on a 100-pocket letter sorting machine, preprinted bar-coded business reply mail is sorted 15.7 times faster than the equivalent manual operation, at a rate of 14,500 letters per hour, with at least 99% accuracy, Sydnor noted.

Sydnor foresees the day when home bar coders will be used for printing Zips on either pressure-sensitive adhesive labels or directly on envelopes. He cited other possible methods of applying bar-coded Zips including preprinting bar codes on business reply letters at the time of manufacture and optical character recognition (OCR) printers of bar codes.

OCR devices could scan the bottom line of typed or printed addresses on letter mail, pick out the Zip Code and print the equivalent bar code at the bottom of the envelope, Sydnor said. For nonmachine-readable addresses, operators sitting at barcoding consoles could read the Zip Code and press adding machine format keys to print the equivalent bar code on the envelope, Sydnor suggested.

High-volume mailers now utilizing computer-driven addressing machines, Sydnor said, could be adapted to print the Zip bar code so it would show through a window on the lower right-hand corner of the envelope for scanning.

Privacy Board Out of Plan

(Continued from Page 14)

said at a recent congressional hearing that he expects Carter to adopt a position on privacy, with attendant recommendations to Congress, by the end of 1978.

Bill Would Limit Bank File Access

Meanwhile, in Congress, the House Banking Committee has sent to the floor for a vote a bill that limits government access to individuals' bank records.

Sponsored by Rep. John J. Cavanaugh (D-Neb), H.R. 13471 successfully withstood efforts by the Department of Justice to weaken the bill by modifying it to maintain open access to bank records for law enforcement purposes. The "Financial Institutions Regulatory Act" will probably be voted on by the House when it returns from a recess which began last week and will run through Labor Day.

The unanimous vote of the banking committee sped the bill on its way with provisions that require notice to the customer in nearly every instance in which a government investigator seeks an individual's bank records and that prohibit exchanges of such information among government agencies.

The House committee approved an amendment, opposed by Cavanaugh, that exempts grand jury subpoenas from the requirement that a bank customer be notified that his records are being sought by the government.

The Justice Department may still try to have the bill sent to the Judiciary Committee in hopes of stalling it there for the rest of this year, sources stated.

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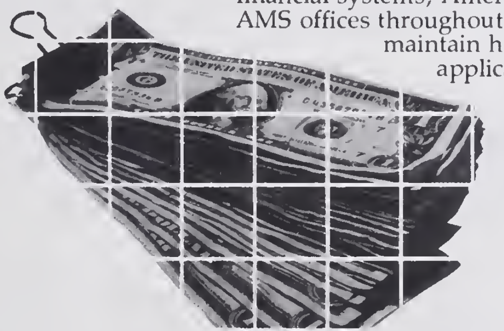

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MIT Work Advances Market Analysis Methods

By Robert de Beaugrande
Special to CW

CAMBRIDGE, Mass. — Computer support systems for analyzing market trends are nothing new. However, the majority of these systems now in operation are not especially "intelligent." They process numerical data such as prices and trade volume but they cannot tell which items of data are interesting or what to do when items are missing. Current systems reason quantitatively, whereas we might prefer them to reason qualitatively.

Steve Rosenberg and Jim Stansfield have been working on this problem for some time at the Artificial Intelligence Laboratory at MIT. Each is building an intelligent support system for market analysis, using different but compatible approaches.

Roseberg's Sleuth program gets its name from its reasoning powers for working with an incomplete or rapidly changing data base. Suppose the market analyst wants to know if the price of wheat is about to rise. This question is entered into the system as a "hypothesis," and the system tries to support it by looking at current events in the market. It is continually reading in newspaper articles and agricultural reports, but concentrating on certain issues.

The system scans this information base and tries to organize relevant items to support the hypothesis of rising wheat prices: weather reports, crop surveys, daily market trends, import-export volume and so on. In other words, Sleuth attempts to organize a large, diverse knowledge base into a compact store of useful information for the analyst.

For this purpose, the system is given background information about the structure of events. Since events have fuzzy boundaries and different instantiations, the system cannot naively accept particular "facts." Instead, it must take bits of information and make plausible inferences.

Events are built from sets of "assertions" and checked against the hypothesis. The "rules" for building events must also be intelligent to serve the varied needs of a large systems analysis.

·This treatment of events has distinct advantages. First, it zeroes in on the data needed by the analyst, no matter how scattered the data might be. Second, it can test new information to see whether the event still holds under the new conditions. Third, it allows the system to function even when information is missing.

Missing information is handled as one or more assertions which the system will try to prove by modifying its rules for building events. For this purpose, the rules must be simplified to exactly that point at which the available information will suffice. Here, the system makes assumptions about the missing information that best agree with what is available.

The capacities for doing such reasoning are quite sophisticated. In effect, the system has enough knowledge of what it is supposed to do to give itself advice about using and simplifying rules as it goes along. That means the rules can be expressly tailored to the current needs of the analysis.

Simplified rules can be created and erased as needed for specific cases. If missing information is supplied later, the system discards its assumptions and rebuilds the relevant event with the full procedures.

The system protects the user from costly errors resulting from oversights and lack of data. The system always uses the information it has optimally but is not helpless when information is lacking. These traits typify an ideal human analyst but are not found in the usual computer support systems.

Comex's Differences

Stansfield's Comex program differs from Sleuth in important respects. While Sleuth can reason about all domains, Comex simulates the analyst's knowledge about special domains, such as agricultural trading. The user doesn't always need to tell the system what he or she wants to find out.

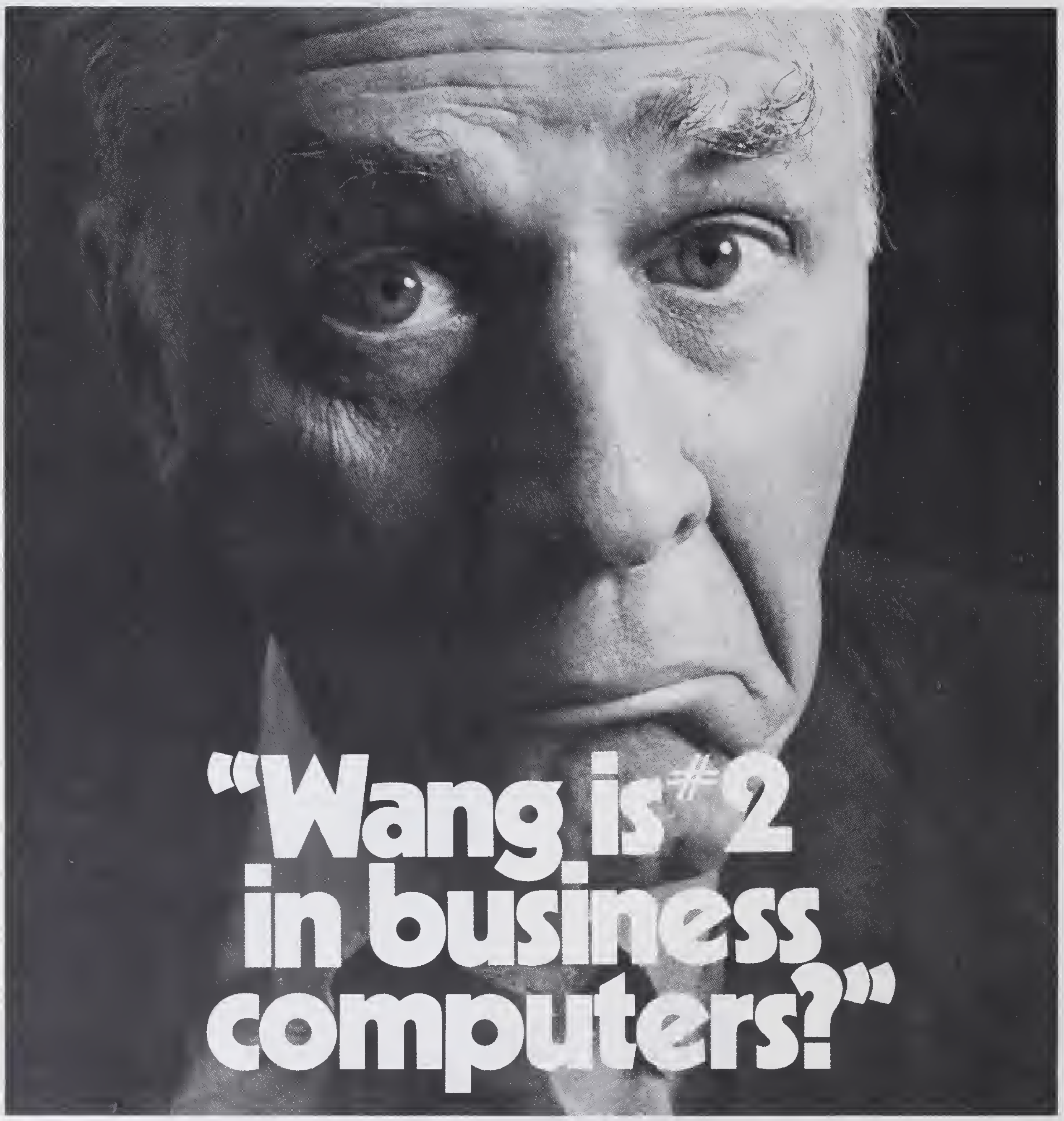
The thrust of Comex is to anticipate specific types of events rather than having to wait and react. Time and DP cost are reduced by an intelligent search for priority information.

The system maintains a store of hypotheses about the current situation and projects them. Factors such as cause and effect, relative order of events and potential outside effects keep a "possibility tree" up-to-date.

Comex tends to take an overview of a given domain, while Sleuth emphasizes the tasks entered by the user. Both approaches seem necessary. A business needs a computer support system not only to give rapid, well-defined help on pressing questions, but also to watch general developments and spontaneously bring useful data to the user's attention.

At present, Sleuth and Comex are running as prototypes programmed in a special "frame representation language" (FRL) at the MIT Lab. Designed by Bruce Roberts and Ira Goldstein, FRL is suited to processing large blocks of interconnected knowledge. The reasoning powers of Sleuth are not handled so well in FRL and will probably be transferred to a language like Planner in the near future.

A linguist with a strong interest in artificial intelligence, de Beaugrande is a professor in the English Department of the University of Florida at Gainsville.



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Sends Data Directly to Press

Fast Greens on Par With Fast Scoring at PGA

By Nancy French
CW Staff

OAKMONT, Pa. — The recent Professional Golfers' Association of America (PGA) championship tournament was marked not only by a record finish but also by the speed with which scores, backed by statistics, were provided to sportscasters and millions of fans watching on TV.

John Mahaffey took the tournament on the second hole in a three-way sudden death finish with Jerry Pate and Tom Watson.

The improvement in reporting was due in large part to a minicomputer system and specialized application software written for this event, according to Jack Mahaffey , general chairman of the tournament and president of the Oakmont Country Club here. The two Mahaffeys are not related.

The computerized scoring system "should definitely set the standards for a long time to come," chairman Mahaffey said.

Along with the Masters, U.S. Open and British Open, the PGA is one of professional golf's "big four" tournaments. This was the first year the scoring and reporting effort for the PGA was bolstered by computer power.

The system, which operated from a trailer adjacent to the 18th hole, was comprised of a Wang WCS-80 system, with backup, contributed by Wang Laboratories, Inc. and specialized programs written by Aptech Computer Systems, Inc., a software firm in Pittsburgh.

The system gave broadcasters access to up-to-the-minute information and scores on a hole-by-hole basis.

Walking scorers recorded scores and handed the information to an operator at each green. The operators telephoned scores directly to two Aptech people in the trailer who input the data to the Wang system.

Within seconds this data was processed and transmitted to 13 video terminals and two high-speed printers in the press tent, two terminals in the clubhouse, one terminal in the ABC tower and 14 TV monitors dispersed throughout the clubhouse.

Instant Predictions

In addition to recording tournament scores during play, the system was programmed to project events to come, according to Jay Troutman, Aptech president.

For example, on Friday afternoon, after only one full day and a few hours of play, the system predicted the cutoff number for the final two rounds. It did so far more accurately than did the sportswriters working with the same information, Troutman said. It also predicted the sudden death finish, but foresaw it between Mahaffey and only one other, he added.

Aptech wrote programs that provided player biographies, hole biographies, a leader board, cumulative scores by leader to end, hole statistics and hole ratings based on the relative difficulty of each hole.

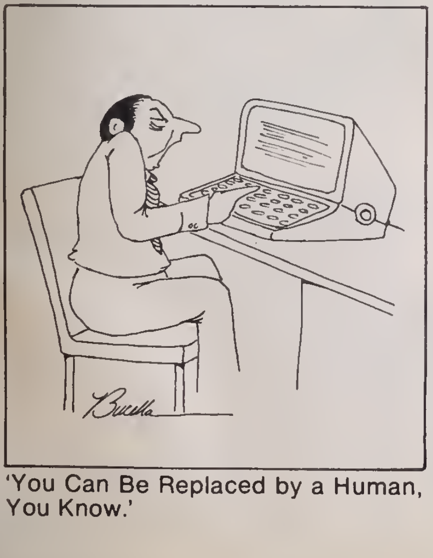
The Wang computer was chosen, according to Aptech DP manager Pat Scott because it is "a completely interactive system that is extremely easy to operate.

The system was planned so that any one of 200 media people could sit down with no prior training and retrieve information from it, according to Scott.

The Wang WCS-80 used at the tournament had 512K of main memory, a Wang 2263 V-2 600 line/min printer, 18 Model 2246 CRT terminals and a 256K WCS-80 for backup. The backup was never used, according to a Wang spokesman. The principal system stayed up throughout the three-day tournament from about 7 a.m. until 9 p.m. each day.

The first use of computers in golf scoring was at Southern Hills Country Club in Tulsa, Okla. during the 1977 U.S. Open, with an IBM System 3. "I was an official at that tournament," recalled Jack Mahaffey, "and thought it was great to have up-to-the-minute information. I saw computerized scoring again in Denver at Cherry Hills in the '78 Open and decided that this year's PGA should also employ computer technology."

Wang Laboratories agreed to loan and set up the equipment, and Aptech agreed to donate the scoring programs and computer operators to input data. The result was the first system with which reporters could directly interact to obtain instantaneous information retrieval.



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Models May Explain Galaxy Shapes

YORKTOWN HEIGHTS, N.Y. — The spiral shapes assumed by most of the observed galaxies in the universe may well be caused by localized chain-reactions of exploding stars, two IBM research scientists concluded here recently.

Computer simulations picturing how such galaxies might evolve over many billions of years, with supernovae — or star explosions — repeatedly triggering the redistribution of matter within a particular galaxy, match actual photographs to an unexpectedly remarkable degree, the scientists found.

The results were obtained by Drs. Humberto Gerola and Philip Seiden of the IBM Thomas J. Watson Research Center here.

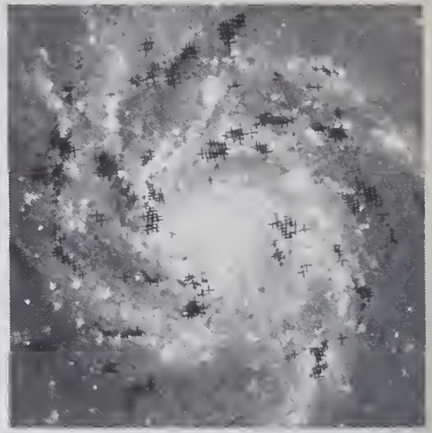
"Our work," Gerola said, "lends support to some recent results that seem to suggest that our own sun was produced by the effect of a supernova explosion. The formation of stars by such explosions may be a very common phenomenon in our own and other galaxies."

Astronomers long ago noticed that about 80% of all the galaxies they could see through their telescopes were spiral-shaped. Somewhat more recently it was discovered that such galaxies were made up of rotating rings of stars, with the inner rings moving more slowly than the outer ones, referred to as the "spiral arms."

What could cause this shape? The only known force capable of acting over such vast galactic distances and through an eternity of time is gravity. But if gravity is the cause, then the spiral arms, which are really made up of stars not nearly so close together as they appear to be from Earth, could not be rigidly attached to the core of the galaxy. If they were, the arms would have broken apart — dissipated — from the forces being exerted by the more rapidly rotating outer part of the galaxy, the scientists explained.

Thus, the "spiral density wave theory" was developed in the 1960s. It assumes that material, under the influence of gravity, is somehow flowing in and out of regions where the arms of the galaxy appear. While in such a region, the material takes on the spiral shape, they said.

However, gravitational effects are not enough to explain the prevalence of spiral-shaped galaxies. For example, the spiral arms predicted by this theory will dissipate in a few hundred million years, while the universe is believed to be about 15 billion years old.



This overlay compares a simulated pattern with the actual photograph of a galaxy known as M101.

"In essence," Gerola said, "the gravitational theory supports the existence of a spiral pattern for only a certain number of years, whereas it seems clear that galaxies with spiral shapes have been this way for almost the lifetime of the universe."

The IBM scientists decided to approach the problem from a point of view familiar to solid state physicists — that of short-range, or local, forces.

Researchers in this field have found interactions that occur over ranges so small that only a few atoms or molecules can possibly be involved, and yet these interactions manage to affect an entire piece of material. For example, magnetism is a short-range force, capable of interacting with only a few atoms within the immediate vicinity of such a force.

Gerola and Seiden used an IBM 370/168 at the research center to test their theory. They constructed two-dimensional galactic models divided into rings that are individually rotated by the computer, according to the actually measured rotation rates of real galaxies. Each ring is divided into the appropriate number of "cells" such that all cells are equal in area.

The observed rotation rates from two spiral galaxies, known as M101 and M81 to astronomers, were used to drive the simulation. They represent two major types of spiral galaxies. M101 has arms that appear broken and sparse; M81 has smoother, more circular arms.

Much to their surprise, the computer simulation of this very simple model matched well with actual photographs of M101 and M81. The computer pattern remained stable in the spiral configuration throughout galactic time spans and showed an excellent correspondence when overlayed on the photographs.

"When we introduced this star formation process," Seiden said, "the model began to produce large-scale spiral features. Although individual stars were constantly being formed and disappearing in explosions, they tended to group themselves into curved, rotating arms that persisted over time periods on the order of the lifetime of the galaxy."

In using the computer simulation, the IBM scientists were free to roam through time, observing galactic evolution from the beginning of the universe to some future point. They found that the spiral pattern forms relatively rapidly, within 100 million years, and persists for at least 30 billion years.

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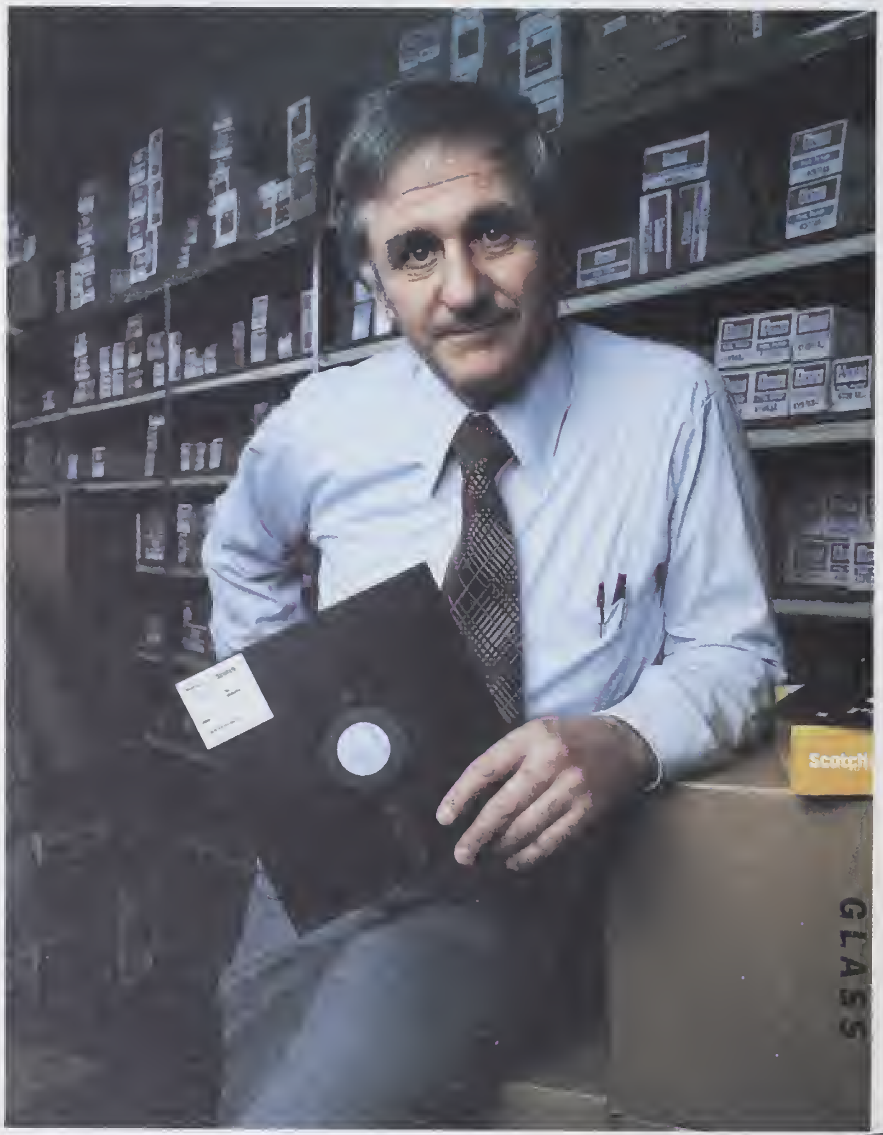

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'Molars' Aids Dental Education, Clinic Care

BALTIMORE, Md. — At the University of Maryland Dental School, Molars has nothing in common with the movie Jaws, or even its frightening sequel.

Molars stands for Maryland On-Line Automated Retrieval System and school officials claim the computerized system will help provide new levels of care for the patients who receive dental services at the school's clinic and also improve the student's educational program.

"We see Molars as forming the base for our comprehensive care clinical system," said Dr. Gerald Charles, faculty liaison for computer usage, "using a computer to keep current and accurate records of every patient that comes to us for treatment."

The University of Maryland Dental School provides more than 100,000 patient visits yearly. Serving the community, the school's students and faculty offer patients a full range of dental treatment, from simple fillings to full dentures.

"We must keep track of the procedures the students accomplish for their patients," Charles said, "since the quality and quantity of the work they perform is important to the students' education and in meeting graduation requirements."

To keep these records, the dental school uses an IBM 370/145, operated by the University of Maryland's Health Sciences Computer Center.

Dental students in their junior and senior years must perform, to the satisfaction of each department, a certain number of procedures — such as fillings, extractions, dentures and periodontal work.

As work progresses, the type of procedure and the instructor's evaluation is entered into the system and can be displayed on video terminals located in the clinic. This information becomes a part of the student's academic record.

"We would not like to postpone a student's graduation because of a lack of a few necessary credits," Charles said. "The computer will help us prevent that situation."

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Editorial

The Right to Decide

For the fourth time, IBM has been awarded a directed verdict in an antitrust action brought against it. So far the corporation has convinced federal judges in the Greyhound Computer Corp., California Computer Products, Inc., Forro Precision, Inc. and now Memorex Corp. trials that its opponents' suits had no merit.

While the first three verdicts were issued before the cases were decided by jury, in an unusual departure from precedent, Judge Samuel Conti granted IBM a directed verdict in the Memorex case after an 11-member jury was unable to reach a unanimous decision.

Conti's justification for preventing a second jury from hearing the case was his conclusion that "the magnitude and complexity of the present lawsuit renders it, as a whole, beyond the ability and competency of any juror to understand and decide rationally."

However, at least nine of the Memorex jurors disagreed with the judge's evaluation, according to affidavits taken after the directed verdict was issued. All nine said they understood the issues very well, and several said a jury should decide this case because a single person could be too easily swayed by personal biases.

Such may have been the case in Memorex vs. IBM, as four of the jurors stated they definitely thought Conti was biased in favor of IBM.

Another reason for keeping a jury was given by Memorex in its motion opposing Conti's order. "As far as trial time is concerned, it is clear we were able in this case to try the issues . . . in a little [more than] four months. Compared with the years of trial consumed in U.S. vs. IBM [with a judge as the sole arbiter], isn't it posible that a jury trial is in the interests of the parties and the judicial system?" Memorex asked.

Finally, where does the fault lie when an issue is decreed by a judge to be too complex for a jury? Trial by jury is a cornerstone of our judicial system and to remove that right would be to subvert the principles behind the process. No case need be too complex for a jury; it should be the duty of attorneys and judges to ensure that legal rhetoric and technical jargon do not so confuse basic issues that the public is removed from any participation in the judicial process.

Antitrust cases affect all our lives. We should not be barred from observing and participating in them because of exclusionary and arbitrary legal rulings.

Data Past

Five Years Ago
August 29, 1973

WASHINGTON, D.C. — IBM was expected to announce a true minicomputer sometime this year if plans made in 1971 held true. In a recently uncovered report from the IBM Management Committee to the Management Review Committee, the group admitted the firm had a "serious problem" in the area of basic minicomputer systems. "The key difficulty is the absence of a general-purpose system at a rental of less than $1,000/mo. Competitors both here and abroad have such systems," the planners said.

— — —

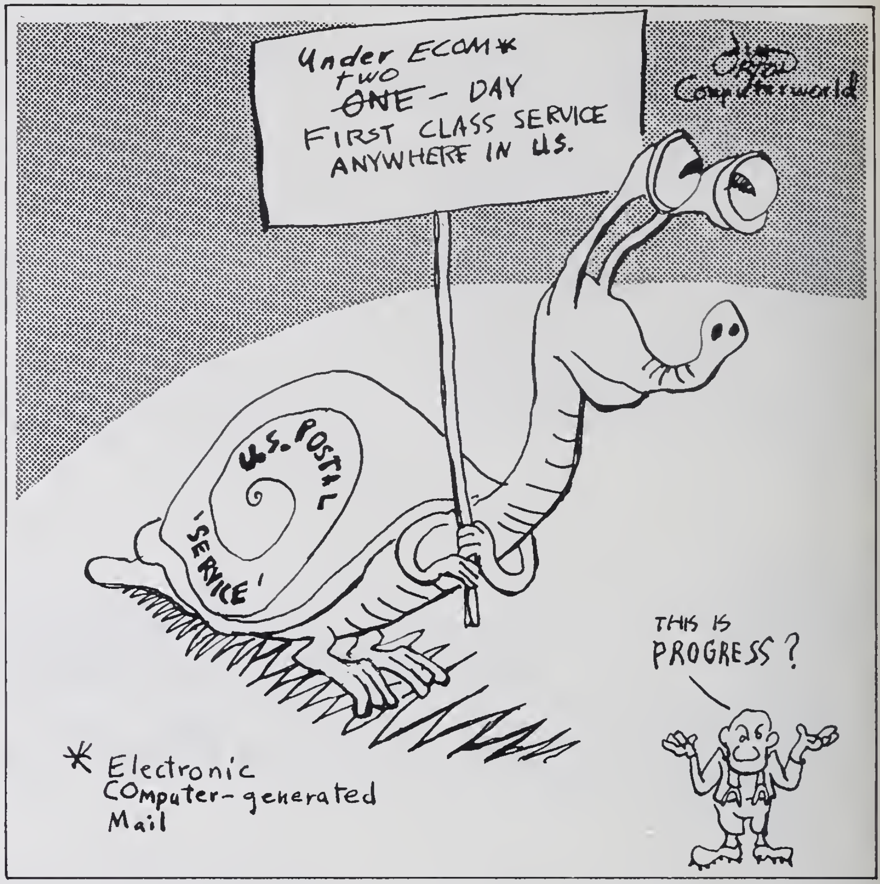
WHITE PLAINS, N.Y. — IBM introduced a data communications line discipline that would benefit users with terminal equipment operating at 2K bit/sec or higher. Synchronous Data Link Control (SDLC) was to be restricted to operating with virtual mainframes and would not be compatible with IBM's standard Binary Synchronous Communications (BSC), the firm said.

Eight Years Ago
Sept. 2, 1970

MADISON, Wis. — In the aftermath of an explosion at the U.S. Army Mathematics Research Center building at the University of Wisconsin, one man lay dead, three others were injured, $1.5 million in DP gear was demolished (representing 13 years of work and more than 1.3 million man-hours) and nearly 20 years of data collected by a staff of mathematicians and DP professionals was obliterated.

— — —

TULSA, Okla. — Savings of up to 53% on purchased equipment and 44% on leased devices, depending on configuration, were available to IBM 360 and 370 users who installed magnetic tape drives and controllers from Telex Corp. to replace comparable IBM units. The addition of the 5803-1 and 5803-2 tape control units to its line of magnetic tape drives allowed Telex to offer the user a complete tape subsystem with improved performance at reduced cost, the firm claimed.



Letters to the Editor

'Frivolous' Discussion

Alan Taylor's column "Should Auditors Offer DP-Related Services?" [CW, Aug. 7] stated that "audit firms, because of their audit functions with their clients, may have an unfair competitive advantage in selling to those clients management advisory services which could be furnished by other DPers."

This appears to suggest that an "unfair competitive advantage" would include such things as familiarity with the client's operations and needs and the ability to conduct a project in an efficient and effective manner. With logic of this nature, we can easily conclude that all firms that have previously rendered services to a client should be precluded from rendering additional services in the future, because good service and satisfied clients represent an "unfair competitive advantage." Obviously, such a prohibition should extend to all services and products purchased by the client.

I have no objection to a reasoned discussion of the merits or possible pitfalls of management advisory services provided by accounting firms. However, we should not allow frivolous issues to impair our judgment.

J. Gregory Bannen
Maner, Costerisan & Ellis, P.C.
Certified Public Accountants
Lansing, Mich.

Undeserving Article

"Warning, Facilities Management No Bargain For Users" [CW, Aug. 14] was not deserving of headline attention.

It was interesting that the profit motivation of the "private, commercial sector" users of facilities management was not addressed by either the writer or Richard Brandon. The vast under-utilization of computer hardware and the tremendous acceleration in the cost of DP professionals is of great concern to many top management people.

There exist hundreds, perhaps thousands, of very satisfied users of facilities management.

Finally, isn't it probable that the cream of Brandon's crop is those same users who might look to the facilities management company to provide not only DP technical support, but to interact with their top management in a manner that would (and does) negate the need of the professional EDP consultant?

J.J. Nakopoulos
Jenkintown, Pa.

Article Hurt Women's Hopes

May I ask why Donnamarie White, who had such a fine article and forum going for her, then slapped women with the typical male chauvinistic portrayal of a woman in the business world [CW, July 31]? A dress code for the business woman is necessary, but why masculinize her so she is seen as a threat? Why does White tell women they shouldn't dress like "a schoolgirl, a housewife or a secretary"?

The answer is, the business world she described was that of 1928 — not 1978. Get with it! Women are women — not to be compared with men or segregated by subsets of women.

I greatly resent White's dress code. While I agree a woman should not try to appear sensually sexy at the office, she should not lose her femininininity. Men don't expect a businessman clone if a female has been hired for her DP skills (programming or management).

Other points were well taken. Businesslike does not mean devoid of femininity.

The article harmed the hope of women to attain positions of rank by skill.

Rosalind B. Wicker
Columbus, Ohio

The Human Connection

User Errors, Not Bugs, Plague Micro Vendor

By Jack Stone
Special to CW

It's bedazzling! It's uncanny! My computer works!

I know it comes as a shock to me, but my newly acquired, albeit interim, microsystem does the job it is intended to do — namely, word processing applications.

And, although I missed my target of a $5,000 one-time charge by about $1,000, I am completely relaxed about it. The reason? About what you'd expect. The machine enabled me to handle a heavy consulting project for a major customer that was otherwise impossible under the tough time and economic constraints. In other words, the machine has already justified itself.

Early in the process of conceptualizing the grand design for my computer center, several physical criteria were obvious.

First, the system could not occupy more space than my base installation site, the tabletop in the galley booth on my cruiser.

Second, the system had to have the property of consummate portability so I could carry it from the boat to the trunk of my Mercedes sedan in two easy trips for transport to a customer site. As the booth also converts into a tightly coupled sleeping arrangement for two, the machine complex also had to respond to the critical need for emergency disassembly and reallocation to secondary storage in the bow lockers.

Third, a high degree of reliability was, of course, very desirable, but not if it were to cost me an arm and a leg. After all, I own a correcting IBM Selectric which would serve as a backup machine.

Well, what can I say?My inamorata is all of the above. I've had no hardware or software failures, and I have trundled that machine all over the eastern seaboard.

Few Failures

There have been a few operator failures, however. The worst one came when I was setting up the machine in my galley for the first time. I found I had conquered the "operating system" load procedure (two commands involving less than 12 characters of input) but only up to, and not including, the first command.

I called for the disk to send me a copy of the nano-OS, but it ignored me. I repeated my calls and even shouted a few times, but the disk was otherwise engaged.

To assure myself I was not the culprit, I carefully checked all of my connections. Although there are five units to the system, the cabling is really a snap. All appeared proper and fitting.

Since the machine worked perfectly minutes before at the vendor's store, I didn't believe anything was seriously wrong, even though I slightly bashed the monitor waltzing it down the ladder from the flying bridge to the grand salon.

So, I swallowed my pride and phoned the boys at the Emporium for debug assistance. Well, they asked me everything about the cable, from the disk to the mainframe. I checked and rechecked the connections and began to fight back.

I told them I possessed multiple advanced degrees in electrical engineering from a prestigious Ivy League university, that I was an aircraft electronics maintenance technician in World War II, that I once assembled my own AM radio receiver with miniature vacuum tubes which worked fine except for the static, that they shouldn't dare suggest I was incapable of plugging in one of their crummy cables and furthermore, their machine was a lemon.

They said they had their varsity maintenance squad on tap, were ready to leave Georgetown to check my system and requested permission to come aboard. Having finally been shown due respect, at least in my role as yacht captain, I calmed down and granted them access, particularly because I had an urgent use for the machine (I was dying to play their new "Target" game).

Well, you guessed it. They found out I didn't connect the plug properly. They walked away toward the setting sun with the dreary farewell, "Lucky you didn't blow out the mainframe."

Letters to Stone should be addressed to him at Suite 222, 2233 Wisconsin Ave. N.W., Washington, D.C.

Reader Commentary

Secret Hopes Bring Out Programmer's Alter Ego

By Robert L. Glass
Special to CW

Mal Microbus works for one of those Big Computer companies with a glass-walled mausoleum flashing lights, twirling tapes and uniformed operators, all visible to the curious public marching past corporate headquarters.

To those public folk, I sometimes think, the computer *is* the company. And of course, the company fosters that image, with its binary beast sitting up front in the corporate zoo.

Mal Microbus is one of the programmers for that Big Computer. Sometimes he fantasizes huge shovels full of his best programming efforts being dumped into the fast-moving input card hopper of the behemoth, like chunks of meat for feeding time at the zoo. The machine consumes, digests and spits out answers. In addition to loading the shovels, Mal sees himself probing through the computer's excrement to find out whether it understood his intentions.

Now Mal doesn't always feel that way, to be sure. Sometimes he sees the computer and himself, arm in arm, going out to battle the problems of the world. They make a powerful team, combining the strength-bestowing cape of Superdigit and the sensual appeal of Bit Woman.

It depends. It depends on whether it's Friday (Superdigit) or Monday (shovel-loader). It depends on Mal's wife's mood — euphoric (Superdigit) or mean red (shovel-loader). And, it depends on Mal's own golf score: subpar (Superdigit) or typical (shovel-loader). Mal Microbus, in short, is a man of many moods. This is the story of one of his private escapes from those moods.

Behind the Scenes

It is important to your understanding of this story to know that tucked away in the corner of Mal's basement is a tiny computer of his own. Away from the public eye. No twirling tapes and only a few flashing lights.

It's a personal computer, modern and bright, hot off the racks of his local computer store. His own Little Wonder LW-80, brought home with infinite care, bucketsful of advice and two books entitled *Tiny Basic Self-Taught* and *Games People Play on Computers*.

The rapidity with which Mal bounds down the basement stairs to his LW when he gets home from the Big Company frightens Maggie Microbus. He barely pauses for a peck on the cheek and a glass of Sparkling Supervin before he races downstairs with wild eyes, his mind seemingly locked in another world.

He carries a ream of well-filled coding sheets in his hand. Think about that for a moment. No, not about the peck on the cheek or the Supervin. Consider those coding sheets. Home from the Big

(Continued on Page 24)

The Taylor Report

Software Improvements Rectify Faulty Message

By Alan Taylor
Special to CW

Last week I wrote about a Merrill Lynch, Pierce, Fenner & Smith, Inc. message network's computer output issued on Aug. 5 but made up of two separate messages, one written about a month earlier. These different messages had been grafted together to produce incorrect output. (The resulting message is shown below.)

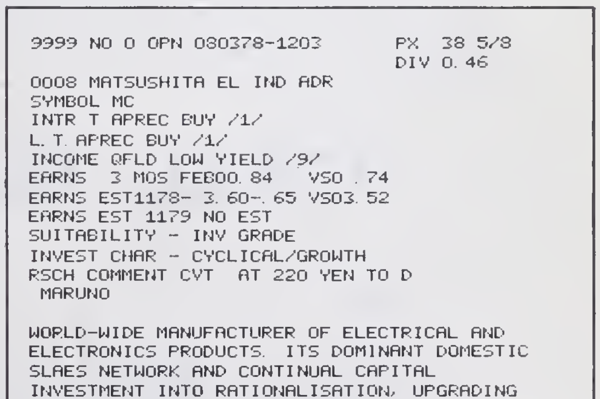
A perfectly valid and familiar technique — that of "personalized letters" — is the problem here. The technique is inherently sound but, in this particular case, insufficient.

The programming error occurred shortly after I requested the review on the firm concerned. The program simply picked up my address and the symbol for the stock, using these to graft a canned text onto a review of the previous night's stock prices. It then sent the resulting misinformation to me.

The program could have easily avoided producing erroneous messages, just using the data it had available. Let's look at the message again, not from the point of view of what the DP people did wrong, but from the point of view of what improvements the software needs.

The first aspect to be analyzed is the grafting process that uses last night's prices. When the message was written, the highest price on the New York Stock Exchange was only 35-5/8. When I requested my information, the market was paying 38-5/8 for the same stock. The program could legitimately check whether Merrill Lynch's Tokyo representative

(Continued on Page 25)



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                                 DIV 0.46
0008 MATSUSHITA EL IND ADR
SYMBOL MC
INTR T APREC BUY /1/
L. T. APREC BUY /1/
INCOME QFLD LOW YIELD /9/
EARNS  3 MOS FEB00.84   VS0 .74
EARNS EST1178- 3.60-.65 VS03.52
EARNS EST 1179 NO EST
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DESPITE ADVERSE CONDITIONS OVERSEAS.  AT BEST
EXPORT SITUATION WILL EMAIN STABLE BUT
EXPECT SOME IMPROVEMENT ON DOMESTIC SIDE
IN F78 AND CONTINUED RAPID VTR SALES GROWTH
IN JAPAN AND ABROAD/ VTR SALES MORE THAN DOUBLE
IN FIRST QTR/SMALL GAINS ANTICIPATED IN F78
SALES AND INCOME.  LT STRATEGY INVOLVES
TRANSFER OF LOW VALUE ADDED PRODCUTS ABROAD
WHILE CONCENTRATING ON HIGH VALUE PRODUCTS IN
JAPAN.  STILL ATTRATIVE BUY.
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Faulty message can be improved.

Reader Commentary

Anything Can Happen

By Lee Halliburton
Special to CW

Murphy's Law is familiar to most of us: Whatever can go wrong, will. There is a corollary that Murphy was an optimist

A recent happening at a large, predominantly real-time, DP center will illustrate this better than many philosophical harangues.

There is an emergency power shut-off button located on a panel underneath the console of the IBM computer system. It's purpose is quick power disconnect from the CPU in case of fire or serious electrical problems. Concerned engineers designed it as a pull switch to avoid inadvertent shut-off if an operator's wayward knee pushes it.

Well, when the operator routinely swiveled his chair to the left to look at the console CRT, his trouser pocket snagged the pull switch. The system immediately went down as if there had been a Con Ed blackout.

Lesson? If the customer engineers have not already done so, you might consider installing a plexiglass guard over the switch.

Mal Microbus Conceals Second Self's Ambition

(Continued from Page 23)

Company with coding sheets in his hand? This story centers on those coding sheets and Mal's moods.

Stashed in the bottom lefthand drawer of Mal's desk at the Big Company is a pad of general-purpose coding sheets. They are the coding sheets for the Big Company's Big Computer. The programs that end up on the shovels going into the card reader begin on those pads.

They are also the coding sheets for the Little Wonder LW-80. Here, my friend, the plot begins to thicken.

Most of the time Mal is working at his desk, he is programming up a storm for the Big Computer. After all, that's what they are paying him for at the Big Company.

But sometimes, when the shovel-loader mood sweeps over him and his emotions nose dive, he quietly shifts into Little Wonder mode. Hardly breaking programming stride, he turns a page, notes LW unobtrusively at the top of the next sheet and begins problem-solving.

As he sits there making his $9.85 per hour from the Big Company, he works on a speculative accounts receivable program for veterinarians' offices. The plan is an outgrowth of encouraging conversations with a neighbor, Crocker Spanielle, who is in the profession. It's Mal's get rich someday scheme, not unusual in the microworld. However, carried out on company time, it takes some "chutzpah."

You are probably wondering how Mal can get away with it. How can a programmer, sitting between row upon row of abutting desks, essentially naked of protective walls and open to the world for anybody to inspect, possibly do noncompany things on company time?

Well, there is a Big Company fact of life I must share with you. Maybe it's even a Small Company fact of life, too. Programming managers (shh — don't spread the word around) don't program.

They can't! If they ever knew how, they have forgotten. In the mad rush to move up the Big Company management ladder, they let their technology atrophy. Oh, they may talk nostalgically about the 704 or the Librascope, but basically, they don't know Pascal from PL/I.

Now picture their dilemma. Even the most astute and controlling manager, marching up and down the rows of programmer desks, doesn't know what he's seeing. Oh, he knows activity from inactivity, productive conversations from bull sessions and documentation from doodling. But Big Computer PL/I from Little Wonder Micropascal? No way, baby!

So there is Mal Microbus, obviously productive. Mal is a star performer in his manager's eyes. It is a little curious that Mal sorts his coding sheets into two piles at the end of the day and often takes work home. But never mind! Mal is a worker, not a dawdler.

Mal's cheating isn't flashy. Management may nevr know he does it. But someday, when he's rich, if that day ever comes, they may wonder *how* he did it.

"That moody guy? I didn't think he had it in him," they will say and put it immediately out of their minds.

Copyright by Robert L. Glass.

Glass is the author of two humorous books about computing: The Universal Elixir, and Other Computing Projects Which Failed *and* Tales of Computing Folk: Hot Dogs and Mixed Nuts. *Both are published by Computing Trends, 3325 Lakewood Ave. S., Seattle, Wash. 98144. He is also a computing specialist at a Big Company, unnamed, but similar to the one in this story!*

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Detach here, fold, and place in post-paid envelope attached through binding.

Letters to the Editor

Response 'Demanded'

The twin editorials of July 31 demand a response. CW lumped together in a single sack as presumed "human rights" violators the following: the Soviet Union, South Africa, Chile, unnamed "East European dictatorships" and unnamed"black Marxist regimes in Africa." It then stated that those listed should be punished by "the slowing of computer technology exports."

The other editorial made the same point, but held out the possibility of redemption by demanding that "all possible economic pressure should be exerted on the Soviets until not only is Anatole Sharansky freed, but also until the Soviet dissidents are allowed to speak freely and emigrate as they choose."

What possible connection could there be between the internal affairs of any foreign nation and the export of American technology to that nation? Are you prepared to stop sending military hardware to Israel because that nation banned the publication of *Farewell, Israel*? The book is an insider's expose written by Ephraim Sevela.

The only question that should be asked by a loyal American is: Is this equipment likely to be used against the U.S. or its military allies? With this simple test, your single sack becomes two sacks. The sack which represents no possible danger to the security of the U.S. contains South Africa and Chile. The "enemy sack" holds the Soviet Union, the East European dictatorships and the black Marxist regimes in Africa.

John E. MacDonald Jr.
Wappingers Falls, N.Y.

What We Said Was . . .

"Mini Runs 'Express' " [CW, July 17] contained a significant misrepresentation of facts supplied by us.

The article stated, in part: " . . . the time-sharing implementation [of Express], still available on Tymshare's remote service, 'has limitations.' "

The information we supplied contained a reference to the limitations of time-sharing in general.

The fact is, our implementation and marketing of Express through Tymshare, Inc. has been and continues to be extremely successful. We neither expressed nor implied limitations in our Tymshare/-Express product. The only "limitation" is one that all time-sharing vendors face in that not all companies want to do their computing through an outside vendor.

Walter E. Lankau
Vice-President
Management Decision Systems
Weston, Mass.

Changes Improve Output

(Continued from Page 23)

would have withdrawn his recommendation *if* he had known it was to be used after a price increase.

To do this by software would have been quite simple. The representative would have been asked upper and lower limits when he provided the actual message. If a particular daily quotation was found to break the limits, a different message would have been sent.

Now, there is nothing particularly difficult in programming such a message once the idea is swept away that the computer must have the last word. The most important part of any computer system is to recognize the boundary conditions that require human intervention.

Human Intervention Needed

Under the current technology, the approach toward human intervention is the same as the Victorian attitude toward sex — hide it. Batch systems may have allowed an excuse, but message systems like the one at Merrill Lynch cannot be excused.

With software improvements, the old information could still be supplied, but added material would address the new situation.

For example, the final three words should be deleted and at the bottom of the message could be a note reading: "Recent changes in the stock price have not been evaluated by our analyst, but he is now in the process of reviewing them. In the meantime, this early July report is provided for information rather than guidance."

Another needed improvement is mention of the yen conversion rate. Merrill Lynch's computer should have access to the current value of the yen. It could have converted the figures from yen to dollars in the standardized data section at the start of the message and reviewed the assumed yen value against the Merrill Lynch representative's expectations.

Let us go further. According to the output, this stock is "cyclical." That is very interesting — but where on the cycle are we? At the top or the bottom? The computer output should include this information.

Parameterized Routines

By now, programmers will have recognized the type of input for which I am asking, the same standard items we have provided for years for initializing thousands of routines. The method I suggest for accurate messages includes the following: check which boundary has been passed, if any, get the correct basic message form, update the items involved, process requests for special consideration and send the complete response to the client.

Despite the simplicity of this, I think we know straightforward changes are not always made easily. And, in the process of getting this material, I found one of our sacred cows of good management may be the direct cause of the type of faulty output we have been talking about. But that is next week's story.

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Pascal Proposal Pondered

By Don Leavitt
CW Staff

WASHINGTON, D.C. — A proposal that could, in the judgment of its advocates, lead to a draft standard for Pascal within 12 months is now being considered by the Standards Planning and Requirements Committee (Sparc) of the American National Standards X3 committee on computers and information processing.

Initially brought to the International Standards Organization (ISO) by the British Standards Institution, the proposal pointed out that two national groups — in the UK and in Sweden — are already working on a Pascal standard and are corresponding with interested people in other countries.

In his letter to Sparc members, X3 Secretary William F. Hanrahan asked them to consider the UK proposal at their Sept. 13-15 meeting and to prepare a recommendation to X3 for its consideration while drafting a U.S. position on the proposal in early October.

X3 has not previously received a proposal on Pascal and therefore has no established position on that language, Hanrahan noted.

The British proposal took note of the current, informal definitions of Pascal — largely in the writings of N. Wirth — but said these were incomplete and, in a few instances, contradictory. A formal standards effort would identify and resolve these problems, the advocates said.

The British took note of the many implementations of Pascal and said the standardization will not involve any development of the langauge. The work is not intended to introduce any changes that will cause currently "legal" Pascal programs to become "illegal," the proposal said.

With "one or two notable exceptions," the changes envisaged by the standard proponents relate to matters of detail. One of the exceptions, the document said, would be type compatibility, since there is currently no generally accepted definition on this topic.

Originally presented to ISO in early June, the proposal said an "attention list"

(Continued on Page 29)

STSC's ACE Seen Easing APL Usage

BETHESDA, Md. — Down with tyranny! Stop the tyranny of the terminal!

That, in effect, is the battle cry coming from Scientific Time-Sharing Corp. (STSC) as the remote computer service firm introduces the initial elements of what it calls the Automatic Control of Execution (ACE) enhancements to the APL-oriented operating system it offers users.

The tyranny of the terminal has developed, according to a spokesman, in part because time-sharing has gained in popularity as a way of getting things done when the user wants to do them.

Along with that increase in use of terminals, however, has come an awareness that time-sharing programs, even when fully debugged and ready for use in a production status, require a person to be at the terminal to run them.

In effect, any time-sharing application today must be accompanied by an operator "who often serves as nothing more than a humanoid babysitter to the terminal," the STSC spokesman said.

There are times when the flexibility of human intelligence is required, he admitted, but much of the man-machine interplay until now has required the human to do perfectly predictable things.

The list is well-known and ACE support has been developed to handle the various items on it, STSC claimed. With a normal system, the operator must sign on and run the job, provide inputs, capture output, react to exceptions, communicate with other processes and, ultimately, sign off from the session.

In place of the often-cumbersome sign-on procedure often required, ACE has a sign-on command which makes it possible to start a task automatically, simply by naming the task. This detached execution support makes use of stored parameters, much as any batch job to be run under JCL, for example, the spokesman suggested.

Similarly, with detached input support, a program can take its inputs from a predetermined file instead of requiring a user/op-

(Continued on Page 28)

'Librarian' Has Archive Feature

PRINCETON, N.J. — The Librarian/VS source management system from Applied Data Research, Inc. (ADR) includes an archiving facility that allows users to retrieve any past version of an updated program, according to ADR.

Most similar systems lack the facilities to return a program easily to some earlier stage of its development cycle, a spokesman claimed. Such a return has previously required a certain amount of manual reconstruction activity on the part of a user who is familiar with the program structure, he added.

Now, however, the enhancement — nicknamed Archie — solves this problem by making the Librarian/VS a total-retention system. All changes applied to a source program at any time during its life are permanently under Librarian control, the spokesman explained.

The changes are retained in their proper chronological order and proper physical position within the program. The Librarian/VS with Archie gives the illusion that a complete copy of the program was made and retained each time the program was updated, he said.

"Elegant, Efficient"

The illusion is supported by "elegant and efficient" internal processing including control information associated with each program that lets Archie determine which changes belong to which update version. All of this is kept within the source program itself, which is subject to a compression algorithm, he said.

With Archie in place, the Librarian/VS user can enter a control statement calling for a past version of a program by date or by version number. A program under Archie control can consist of up to 255 versions, each of which is instantly retrievable, he claimed.

Librarian/VS Version 2.0 with Archie is available for $5,400 for DOS users or $6,300 for OS installations.

ADR is in the Route 206 Center, Princeton, N.J. 08540.

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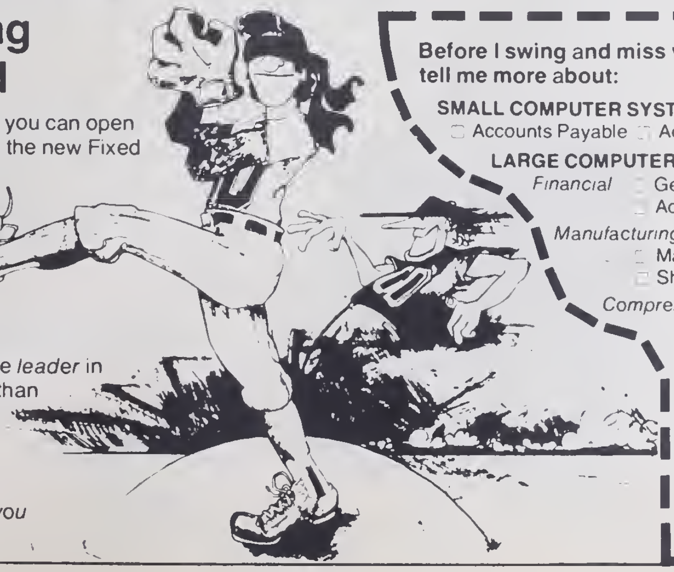

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Independent's Disk Driver Overlaps Seeks on PDP-11s

EDINA, Minn. — Described as a compatible replacement for the disk driver routines distributed by Digital Equipment Corp. as part of the RSX-11M environment, CCS-11 DBDRV is a driver developed by Cytrol, Inc. to enhance the operation of PDP-11s.

In addition to duplicating the functions performed by the DEC-supplied software, the Cytrol drivers — separate modules exist for the various disk types — make use of hardware features already in the disk controllers but not utilized by RSX-11M, a spokesman claimed.

Parallel I/O

The additional features are said to include: initiation of I/O requests for all drives in parallel, use of the SEARCH command to reduce controller busy time (on RM and RP disk systems) and accommodation of hardware arbitration of dual-ported drives, he said.

The parallel initiation of requests to drives on the same controller can substantially increase the rate at which the disk subsystem can process I/O, he noted, adding that CCS-11 DBDRV does this by overlapping head movement operations on several drives.

Since seek time is, on average, about 75% of the total request completion time, seeking drive locations in parallel increases the number of requests that can pass through the disk system. The Cytrol driver allows requests to different drives to start concurrently.

The maximum achievable throughput depends on the number and type of drives in the system. The actual throughput depends on distribution of accessed data within and between drives, among other things.

CCS-11 DBDRV is distributed as source code and may be installed as a resident or loadable module. Usage is by license with a one-time fee of $2,100 for the first copy.

Cytrol is at 4570 W. 77th St., Edina, Minn. 55435.

ACE Simplifies APL Production

(Continued from Page 27)

erator to type input every time it is required, he said. Since files can be shared under STSC's system, several different users can create or modify them, under program control.

Detached output, another ACE facility, directs output to an APL-Plus file for use when and where it is wanted. Again, the operator need not be standing by a terminal to "catch" the output when it is ready.

Since a human can plan to handle almost any exception that may occur during program execution, STSC reasoned that handling routines could be preprogrammed to ease that element of the terminal's tyranny over the user. So too with signoff, whether a program runs to completion or runs out of control, the STSC spokesman said.

Specific details about ACE are available from STSC, 7316 Wisconsin Ave., Bethesda, Md. 20014.

Correction

The correct address of Eon Co., the vendor of the program for testing the quality of printers ["Program Tests Print Systems," CW, June 26], is P.O. Box 6372, Anaheim, Calif. 92806.

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'Oasis' DBMS Enhanced

WINDSOR, Ont. — Version 1.5 of the Oasis data base management system (DBMS) from the University of Windsor includes a rewritten SELECT file service, enabling users to select or order populations not only at the record level, but also at the segment level, a spokesman reported recently.

Originated at Stanford University, Oasis supports batch and on-line access of any file as well as the integration of previously stored data to support new applications. It includes a command language so that data can be retrieved without conventional programming, he said.

The enhanced version includes an ability to parenthesize conditionals within a selection criteria. Shortened mathematical notations for logical operators and connectors have also been implemented, the spokesman said.

Retrieval services have been enhanced to retrieve not only a single segment type or element, but also a complete record, as well as all occurrences of a segment type or element at one time, he added.

Running under OS or OS/VS on IBM 360/370s, Oasis object code supporting all facilities costs $30,000 plus 10%/yr after the first year. "Substantial" discounts are available to educational institutions, according to college spokesman L.F. Miernicke, University of Windsor, Windsor, Ontario N9B 3P4, Canada.

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TP Monitor Beta Than Ever

CANOGA PARK, Calif. — Release 5.1 of the Betacomm teleprocessing (TP) monitor from Informatics, Inc. is said to include a Source Library Maintenance/Remote Job Entry (SLM/RJE) feature that enables the application programmer to work on-line in a DOS or DOS/VS environment.

Betacomm is a fullyqueued, multithreaded system, according to a spokesman, who added that SLM/RJE enables the user to create new programs or manipulate previously stored source statements on-line, using standard DOS Source Statement Libraries, Panvalet from Pansophic Systems or the Librarian from Applied Data Research, Inc.

Since Betacomm is compatible with most spooling systems, programs can be submitted for compilation or assembly into a batch partition for immediate or deferred execution. Output can be returned to the originating terminal, a different one or the system's printer.

Other enhancements offered under Release 5.1 include improved MTCS and Swift interfaces requiring no user programming changes, core indexes for ICM files, improved RPG-II interface for data manipulation and accumulation of tuning information, the firm said.

Betacomm costs $15,000 to $20,000 depending on options selected, the spokesman added from 21050 Vanowen St., Canoga Park, Calif. 91304.

Manufacturing 'Mini-Miz' Adapted to DG's AOS

ENGLEWOOD, Colo. — Manufacturing Mini-Miz, an interactive, online accounting and inventory control system from the Automated Quill, Inc. (AQI) has been enhanced to run under AOS on the larger Data General Corp. Eclipse minicomputers.

Previous versions of Mini-Miz ran on DG's Novas and Eclipses under RDOS, an AQI spokesman noted.

The current implementation covers six fundamental areas for the manufacturer and includes bill-of-material processor, a material requirements planning function, support for work-in-progress, finished goods inventory control, purchasing and receiving and nearly a dozen basic accounting systems, he added.

The reports out of the bill-of-material processor include indented parts lists, parts explosions including raw materials and subassemblies, and a shortage listing of inventory items required. Estimating — including raw materials, labor and outside services — is also supported, the spokesman said.

The Work-in-Progress subsystem tracks jobs from order to completion and also tracks cost of labor, raw materials and outside services. Actual cost vs. budget reports, at the consolidated or detail level, are also provided, he said.

The AOS-oriented Mini-Miz, costs $24,500, AQI noted from Suite 5, 3501 S. Corona St., Englewood, Colo. 80110.

Regional CPE Group Plans Texas Meeting

AUSTIN, Texas — Anyone interested in computer performance evaluation (CPE) is invited to attend the next meeting of the Southwest Computer Measurement Group, to be held at the Hilton Inn at Highland Mall here on Tuesday, Sept. 19.

As a member of the federal DP reorganization project, Philip Kiviat will discuss the implications of the project for both the public and private sectors. As president of the national Computer Measurement Group, he will also talk about how the national and regional groups relate to each other and will then answer questions.

The day-long session will also include a discussion of the system used by the Texas State Comptrollers Office for documenting, analyzing and reporting all hardware and software failures.

More information is available from conference chairwoman Connie Smith at the Texas Department of Human Resources, John H. Reagan Building, Austin, Texas 78701.

Standard for Pascal Under Consideration

(Continued from Page 27)

of omissions from and deficiencies in Jensen and Wirth's Pascal Report (1975) could be completed by the British working party by "mid-1978."

Those to whom Hanrahan's letter was addressed were invited to submit comments or recommendations, in writing, for X3 consideration.

Other sources indicated that input from any interested people would be welcome. Suggestions should be addressed to X3 Secretary, Suite 1200, 1828 L St. N.W., Washington, D.C. 20036.

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Conversion Tools Simplify Medical Reclassifications

ANN ARBOR, Mich. — With funding from the Department of Health, Education and Welfare, a range of materials is being developed and will be distributed by the Commission on Professional and Hospital Activities (CPHA) to help installations in the health care field convert to the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM).

The materials, including a choice of conversion tables, diagnoses and procedure code groupings, data editing aids and codes and titles lists, are necessary for the successful implementation of the coding classification which goes into effect Jan. 1, a spokeswoman explained.

ICD-9-CM is intended for use in publicly-funded programs including Medicare, Professional Standards Review Organizations (PSRO) and the Cooperative Health Statistics System, where it will replace both of the current classifications, H-ICDA-2 and ICDA-8, she said.

DP systems and programs will have to be modified to accept the new classification. The support materials, in hard copy or on magnetic tape, should help the effort, she said.

The ICD-9-CM to ICD-9 conversion table will be ready Sept. 1, while the tables to convert ICD-9-CM to H-ICDA-2, ICDA-8 or to both of the older standards will be ready Dec. 31. In hard copy, they cost $50 each; on 9-track, 1,600 bit/in. tape, they cost $145 apiece.

The Diagnostic Code Groupings and the Procedure Code Groupings will be available separately Sept. 15 for $20 (hard copy) or $105 (tape).

The data editing aids, with sex-specific codes and abbreviated titles, sex-specific codes and full titles or nonexistent codes will also cost $20 or $105 each, while the codes and titles lists with either full or abbreviated titles will cost $30 and $125 each.

Documentation on ICD-9-CM itself may be ordered through the American Hospital Association or CPHA, 1968 Green Road, Ann Arbor, Mich. 48105.

'Tigs' Enhances Cyber Graphics

MINNEAPOLIS — The interactive Terminal Independent Graphics System (Tigs), just introduced by Control Data Corp. for use with CDC Cyber 70, 170 and 6000 series CPUs under the Network Operating Systems (NOS), allows application programs to be transported betweeen terminal types without change, according to a spokeswoman.

Tigs can construct, organize and display graphic materials in either two- or three-dimensional mode and interactively modify those displays. The three-dimensional mode includes perspective viewing, she noted.

The system is made up of three primary components. A preprocessor consisting of a single set of Fortran subroutines provides display generation and interactive capabilities for a virtual terminal.

A "neutral display" file maintains the output of the preprocessor for access by the postprocessor, which translates the information into device-dependent commands for the specific graphics terminal to which the display is being sent, she continued.

Tigs can be purchased for $13,300 plus a $500 initial fee. Lease cost of the package is $320/mo plus the initial cost. An optional central enhancement and maintenance service is available for $200/mo, the company noted.

Basic WP System Runs Under RSX

PALO ALTO, Calif. — A word processing (WP) system written in Basic and capable of running on any system supporting that language is now available from Promedics Data Corp.

Described as very flexible, the system features include disk storage, automatic data insertion, global search and replacement and block text move or copy, a spokesman said.

A bell warning at end of line, ruler option, automatic centering, underlining, cursor backspace and erase, automatic new line generation, paging and multifile concentration are also supported by the software, he said.

Currently running under the CP/M operating system and under Digital Equipment Corp.'s RSX-11M, the system costs $750 from Promedics, 1032 Elwell Ct., Suite 240, Palo Alto, Calif. 94303.

Utility Backs File Matching

BROOKLYN, N.Y. — IRTmatch, a generalized IBM 370-oriented file matching program from Comserco, compares key fields of two sorted sequential input files and, for each input file, distinguishes matches from nonmatches, according to a spokesman.

Depending on whether the records are matched or unmatched, they can be transferred onto different output files, not transferred at all, marked with different mark characters inserted in front of their text or (for matched records only) marked with data copied from the first matching record on the opposite input file, he explained.

IRTmatch control cards use field and format operands (similar to those used on the sort statement of the IBM sort program) to describe the key fields that are to be matched. This makes IRTmatch an extremely easy utility to learn. Its use can save many hours normally needed to write all the special-purpose matching programs developed in a typical DP environment, the spokesman claimed.

Input records may have fixed-, variable- or undefined-length record format and may be converted to different record format, block size and/or logical record length for output.

IRTmatch will usually run in less than 64K unless large block sizes are being used. IRTmatch can run under OS, SVS or MVS with the 370 instruction set.

The utility costs $975 and can be ordered from Comserco at 1055 E. 45th St., Brooklyn, N.Y. 11203.

Not So Mini Anymore — Part 6

Data Integrity, Availability Keys to DBMS Use

Concluding the series on business-oriented minicomputer software, this article discusses mainframe and minicomputer data base management systems (DBMS) with particular emphasis on data integrity and rapid recovery from transaction failures.

By Ken Cohen

Special to CW

Data base management systems (DBMS) are becoming the new focus of attention for many computer suppliers and buyers alike. Just as compilers and operating systems occupied center stage for a number of years, the DP industry is now directing its energy toward vastly improving the quality and quantity of DBMS.

Since the late 1960s these systems have been used on large mainframes to lower programming costs and to simplify data file management and computer use. With the continued emphasis on distributed processing, business users especially will be looking to mini suppliers for DBMS offerings as well.

Two important considerations in a DBMS investment are: Will the data base be available at all times? What happens to the data base when a transaction fails or the system goes down?

Any good DBMS should be able to put these concerns to rest. Commercial users are generally aware of mainframe DBMS offerings, but most are unaware that many minicomputer DBMS are as sophisticated as their mainframe counterparts, if not more so in the vital area of data base integrity.

What Is Integrity?

The integrity of the DBMS is the key that will enable on-line transaction processing systems to answer the business user's needs. "Integrity" requires definition, for it is an issue that has not been tackled by most computer suppliers. Therefore, most people are not aware of its true meaning and implications.

Integrity is not to be confused with privacy or security. "Privacy" suggests the restriction of access by certain personnel to designated information. Only people knowing a certain password, for example, would be allowed to look at payroll information.

"Security" implies that the data cannot be corrupted by any deliberate or unauthorized attempt. A password may be used to control access to particular data, but security also must deal with controls to prevent unauthorized personnel from modifying or corrupting data.

Data integrity means, or should mean, that the data base — the physical files — is always correct, up-to-date and available to the user. Integrity insures that nothing can happen that would cause the data to be inconsistent, contain misinformation or be lost. If the system goes down or an error is made during a transaction, recovery procedures enable the user to return to a known condition of data integrity with a minimum of time, expense and difficulty.

Since real data integrity in a multiuser, transaction-oriented environment is an issue just now being addressed, only a few DBMS can really claim to provide it. A key new concept in data base management which will significantly enhance data integrity is the ability to back out an erroneous transaction automatically without disrupting the data base or other users.

Every DBMS has safeguards to prevent data corruption in case of a system crash or power failure. But some systems actually undo the effects of an abortive transaction while the DBMS is still running or other transactions are going on and insure that the data base will remain correct. For example, Adabas from Software AG can catch and correct the error and maintain the data base's integrity without disrupting other users.

These systems will essentially back out the erroneous transaction — any updates that had been completed are undone and appropriate error messages are produced. Meanwhile, other transactions continue running unaffected.

Most systems now in use handle single transaction failures in a cumbersome manner. They simply identify that a transaction has failed in midprocess and leave it to the user to undo any damage. In this situation, it is frequently impossible to tell at which point the transaction failed. This, in turn, makes it difficult to know which data has been changed and which is left to be changed. Consequently, the user cannot determine with any certainty whether his data base is still correct.

The easy way out for many systems, and one that is extremely time-consuming for the user, is to return to a known good state of the data and reapply all transactions that have gone on since. If it took six hours to put those transactions through originally, it may take one to two hours for transaction simulators to fire off the logged transactions and put them through the data base chains again.

Data Logging

The issue that a truly integral DBMS must face then is this: How far back is that known "good point" and how

(Continued on Page 34)

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12	Ottawa, Ont.
12	Baltimore, MD
24	Rochester, NY
24	Houston, TX
26	Dallas and Fort Worth, TX
26	Honolulu, HI
26	Montreal, Que.
26	Phoenix, AZ
31	Richmond, VA

November

1	Columbus, OH
8	Milwaukee, WI
9	Seattle, WA
14	Boston, MA
14	Charlotte, NC
15	Piscataway, NJ
15	Pittsburgh, PA
16	Atlanta, GA
16	Newport Beach, CA
16	Philadelphia, PA
30	Salt Lake City, UT
30	Washington, DC

December

5	Baton Rouge, LA
6	Detroit, MI
7	Denver, CO
7	Hartford, CT
7	Oklahoma City, OK
12	San Francisco, CA
13	Chicago, IL
13	Indianapolis, IN

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ADM 31

ADM 42

300 Series
Ballistic Printer

VDP 410

VDP 1000

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A lot of people need a smart terminal with a full two pages of display. But can't get them. Not even on terminals costing several times what they want to spend.

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We made the ADM-31 completely self-contained, with a keyboard, control logic, character generator, refresh memory, and interface. Along with full editing, formatting, and protected fields capabilities. What's more, it has a microprocessor which makes it even more reliable and easy to use. And the ADM-31's behavior modification even gives you a factory installed personality.

If this sounds like just the thing you need, it should come as no surprise. After all, you were the one who told us what you wanted.

THE ADM-42 DOES EVERYTHING BUT THINK FOR ITSELF.

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So our engineers designed the ADM-42.

A terminal that actually seems to get smarter the more you use it.

THE 300 BALLISTIC™ PRINTER COMES WITH BELLS & WHISTLES STANDARD.

Our customers said they'd like to see bells and whistles as standard equipment.

And that's what we gave them.

The 300 is a low-cost printer with a built-in microprocessor that gives you 15 switch selectable form lengths, 15 perforation skip over formats, and full horizontal and vertical tabulation control. Plus a non-volatile forms retention system that retains these programmable settings when power to the printer is turned off.

And like all our Ballistic Printers, the 300 dependability originates with its ingeniously simple, patented Ballistic Print Head. Which lets it purr along at a respectable 180 cps.

So when you buy our 300 Series Ballistic Printer, there's only one thing we won't offer you much of. Options.

Because, on the 300, most of them are standard.

OUR VDP-410 KNOWS HOW TO KEEP THINGS UNDER CONTROL.

A lot of OEMs said they needed a building block for system development. Something that would give them the flexibility to configure a variety of systems.

So we built the VDP-410. The intelligent controller in the plain brown box.

It's a low-cost, 16-bit CPU with enough speed and ports to support a variety of peripherals. And it lets OEMs build a multitude of systems. From communications controllers without external storage capabilities, to sophisticated timesharing systems with a string of terminals, printers, and disks.

The OEMs said they wanted something simple, intelligent, and powerful. So we built it.

Because what was a good idea to OEMs turned out to be a real brainstorm for us.

THE VDP-1000 SPEAKS YOUR LANGUAGE.

People told us they needed a complete small data system with the attributes of larger, more expensive systems.

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LEAR SIEGLER, INC.
DATA PRODUCTS DIVISION

A Business Basic Bows

CAMBRIDGE, Mass. — ECD Business Basic from ECD Corp. is an extension of Dartmouth Version 6 Basic designed specifically to meet the needs of small businesses. The most important feature of ECD's Basic is its array handling capabilities, a spokesman said.

Any array can have intermixed elements of variables, vectors, strings or Boolean values. Thus a single array could contain such diverse entries as a customer list with name and address, open account items and indication of delinquent status, he explained.

All arrays are dynamically allocated, the spokesman continued. This eliminates the need to dimension them and is particularly useful, he said, when adding information to or taking it from an existing array.

Intended for use on the company's X7 and Smart Ascii systems, the ECD Business Basic interpreter supports variable names up to 80 characters long, string handling functions for strings of unlimited length and graphics capabilities. It contains "the usual" Basic instruction set, but also provides an exit to execute assembly language subroutines, the spokesman said.

ECD's Basic uses about 20K of memory on the X7 or Smart Ascii environment. Versions are available which use floppy disks, minicassettes or audio cassettes.

The software is provided free with any 32K X7 or Smart Ascii, the firm noted from 196 Broadway, Cambridge, Mass. 02139.

Data Integrity, Access Essential to DBMS Use

(Continued from Page 31)

much will the DBMS do to help the user reach this point efficiently? Certainly the capability to back out an erroneous transaction is a major step toward speeding up the recovery procedure or preventing the need for it. Data logging also can have an effect on rapid recovery from transaction or system failures.

Typically, every transaction is recorded on tape, maintaining sequential log files. When updating records, for example, the DBMS will access the desired information, transfer it to the logging tape and record the updated information. When updating is completed, the tape contains before and after images of the data.

When a system goes down or a transaction fails, it becomes necessary to find some known good checkpoint on the tape. The tape must be processed backwards. Sometimes it's one reel, sometimes it's two, three or even more. It can be, and usually is, an extremely lengthy procedure.

Random Disk File

With a random disk logging file, many of these headaches would disappear. Instead of writing sequentially to a tape, it would be possible to log the original data on a disk and then add updates, if needed, in the same location. Only the most recent images and updates would be on record.

Recovery would take place by doing direct physical level I/O to restore the data base sector by sector to its good state.

From the log pack, it could be determined to go to track 5, sector 2, for example, and change that data. Ordinary logging procedures require accessing a record with a certain key, which means going through the whole system overhead to locate the record that needs to be changed.

When a system crash or transaction error occurred, the user would not have to go back to the previous day's information or go through three or four updates to restore data in the data base. The most recent image would be in the direct access log file. The user would only have to take the log file, reapply it to the data base records last being updated and the data would be restored to its good state. It would be possible for the user to get back to the beginning of any transaction with very little overhead and within a matter of minutes.

Minimal Space

Space requirements for a system of this sort would not be a negative consideration. An additional disk spindle would be required on-line. But read-only files · not requiring updating would not use up log space. Since only the most recent image of the data is retained, the actual amount of space required to store on a disk would be less than the sequential format required by tape logging.And disks can hold up to 256M bytes of information, whereas tape averages only 40M to 45M bytes.

Primary emphasis to date in marketing DBMS has focused on the features and speed of the system while up and running. It doesn't do the user any good to have extremely fast update if every three days he has a system crash and loses eight hours' work.

With the increasing movement toward distributed processing and the corresponding increase of minicomputer applications, commercial users should be aware that minicomputer manufacturers are equipped to handle their business software needs. There are some mini DBMS now that can say yes to these questions. Will my data base be available to me at all times? Will I be able to return to a correct data base with a minimum of time, expense and difficulty?

How many mainframe suppliers can say the same?

Cohen is product manager, commercial software, at Interdata.

Key to disc on Data General.

I doubt it.

Transaction processing on NOVA 3's.

Highly unlikely.

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Impossible!

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Unlike IBM's SNA

ACS to Suit Intercompany Needs: Doll

By Ronald A. Frank
CW Staff

NEW YORK — AT&T's recently announced Advanced Communications Service (ACS) will provide users with capabilities not available with IBM's Systems Network Architecture (SNA), according to Dr. Dixon Doll.

Speaking at a recent seminar on ACS sponsored by the Yankee Group, Doll said ACS will be well suited for both intracompany as well as intercompany services while SNA and similar architectures from other mainframe vendors were designed only for intracompany communications.

Unlike SNA, ACS will offer message switching, which could lead to some form of electronic mail service, especially since ACS will include a store-and-forward capability, he said.

In addition, users of SNA have had to fend for themselves in the area of system fault isolation and many have built tech control centers in-house. ACS promises diagnostics and fault isolation built into the service, thus potentially saving users from developing this type of capability, Doll said.

Despite the additional features promised by ACS, it will be difficult for SNA users to switch services. As an example of the incompatibilities, Doll pointed out that Tcam, Vtam and other access methods were not designed for use on packet nets such as ACS. Therefore, mainframe vendors will have to design modified access methods if they want to provide packet net compatibility for users of their architectures.

On the other hand, SNA has features ACS does not address. For example, network operating systems, data base support and remote job entry software have not been announced as part of ACS, Doll said.

Access Software

While it is doubtful mainframe vendors will want to offer ACS-compatible software, Bell has plans to offer an access method for ACS that will reside inside the user's CPU. If this software becomes available, users will not have to extensively modify their programs in-house.

Making another comparison, Doll said many ACS features are similar to the capabilities found in computerized PBXs. Among these are call forwarding, call transfer and camp-on.

While ACS will be offered in a limited number of cities, the need for off-net extensions will remain. This means conventional phone lines will still have to be used with modems and local loops to tie many users into the nearest ACS terminal point.

Another speaker, Lawrence Roberts, chairman of Telenet Communications Corp., said the X.25 support of ACS would give it compatibility with most of the developing public packet networks.

While some observers have expressed concern about extensions to the basic CCITT X.25 standard, ACS will have the same type of added features. Typically these extensions add accounting or similar information to the basic information, but they in no way affect the internetwork compatibility of X.25, Roberts explained.

Thus far, ACS plans have not addressed the issue of installing leased concentrators at user sites. If this type of ACS service were offered, it would be a direct challenge to

(Continued on Page 36)

Company's Accounting System To Tap 56 Foreign Locations

By Brad Schultz
CW Staff

PHILADELPHIA — A large manufacturer here is implementing an international accounting information system intended to eventually provide corporate headquarters with overnight dollar figures on the financial performance of 56 foreign profit centers.

Pennwalt Corp. is using Communications Satellite Corp. (Comsat) facilities to link its 2M-byte IBM 370/158 under VS1 with the General Electric Co. Mark III time-sharing service.

Pennwalt has plants and offices in 19 nations, so the firm's management must deal with that many different currencies. Each currency can fluctuate unpredictably, reflecting the vicissitudes of international economics, such as floating exchange rates, devaluations and inflation.

The GE service was selected partly because it is worldwide, with facilities in all areas where Pennwalt functions, a Pennwalt source explained. The firm also respected GE's stature as a computer terminal vendor and its ability to provide worldwide maintenance and support.

"Training is simplified and operational problems can be more easily resolved because the same equipment is installed at every location," the source said.

The Philadelphia facility has implemented special software on its 370/158, enabling the CPU to emulate a binary synchronous IBM 2780-type terminal, for dial-up 2,000 bit/sec remote communications with the GE Mark III faciilty in Cleveland, according to Pennwalt's Gene Stiefel.

Pennwalt's system employs an IBM 3705 communications front-end control unit and Bell 201A modems in its link with GE. The 370/158 also features IBM's Systems Network Architecture with the Network Control Program mode, Stiefel added.

Transmission Process

Each foreign profit center enters data in its own currency at a terminal connected by tel-

(Continued on Page 36)

Coupler Runs at 1,200 Bit/Sec

SUNNYVALE, Calif. — A 1,200 bit/sec full-duplex acoustic coupler is available from Anderson Jacobson, Inc. and Racal Vadic. As a result of an agreement by the companies, the coupler will be available from Anderson Jacobson as the AJ1234 and from Racal Vadic as the VA3434.

The AJ1234/VA3434 will impact users of acoustic couplers, who have been limited to 300 bit/sec full-duplex operation. Now, by replacing their present coupler with the AJ/Vadic unit, users will be able to increase full-duplex data transmission speed by a factor of four, while still retaining the portability an acoustic coupler provides.

Users may select either a 1,200 bit/sec full-duplex acoustic coupler or a 1,200 bit/sec full-duplex modem. Like the Vadic VA3400 modem, the acoustic coupler provides an asynchronous 1,200 bit/sec full-duplex interface to the computer or terminal but transmits information on a synchronous basis to the remote modem. Users may also select Bell Data Access Arrangement (DAA) operation, according to a spokesman.

Avoids Distortion

The VA3400 modem transmits data in the high band (2,250 Hz) and receives data in the low band (1,150 Hz). This places the second harmonic distortion, created by the carbon microphone found in most telephone hand sets, at 4,500 Hz, which is outside the band of the coupler's received signal.

The unit price for the AJ1234/VA3434 is "less than $900."

Racal Vadic is at 222 Caspian Drive, Sunnyvale, Calif. 94086, and Anderson Jacobson, Inc. is at 521 Charcot Ave., San Jose, Calif. 95131.

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Virtual Modem Compatible With Most Codes

SCOTTSDALE, Ariz. — A virtual modem claimed to be compatible with most transmission codes and line control disciplines and able to replace three modems or digital service units has been announced by Comtel Corp.

Comtel's Model VMC2 can serve any application in which remote devices are operated within 100 feet of the communications controller, the firm said, adding the device is RS-232C compatible and delivers synchronous and asynchronous, full- and half-duplex operation.

Comtel also announced another virtual modem compatible with most transmission codes and line code disciplines and able to replace two modems or digital data service units.

The Model VMR3 may be used as a low-cost modem replacement unit in any application requiring multiple remote stand-alone devices at the same site, the firm said, adding that this product features synchronous and asynchronous full- and half-duplex operation and transmission rates to 19.2k bit/sec.

Hence, the RS-232C-compatible VMR3 can attach one more stand-alone device or cluster control unit to a single modem than can the VMC2, the firm indicated. The user can add devices at an existing site without additional modems or communications lines, allowing three added devices to appear as separate stations in a multipoint network.

With delivery promised within 60 days of order, the VMC2 and VMR3 cost $550 and $330, respectively, Comtel noted from P.O. Box 3392, Scottsdale, Ariz. 85257.

Firm's Accounting System To Tap 56 Foreign Sites

(Continued from Page 35)

ephone lines and through a network of synchronous remote and central concentrators to the Comsat facility for transoceanic transmission.

The concentrators identify senders, check for transmission errors and convert codes while routing data to and from the proper files. After processing by the Cleveland Mark III center the data is transmitted to Pennwalt's CPU, where it enters consolidated statements without any operator intervention.

Copies of reports with data in local and U.S. currencies are also printed out, and this same information is then transmitted back to the sending location, the Pennwalt source explained, noting that all communications to and from the 370/158 proceed in batch mode.

GE's Mark III network is comprised of three computer centers located in Cleveland, Rockville, Md., and the Netherlands, a GE spokesman noted, adding that each center features Honeywell Information Systems, Inc. 66/-88 mainframes supported by Gcos software and IBM 370/158s supported by VS. The HIS hardware handles both interactive and batch processing, while the 370s do batch only.

There are now 17 foreign profit centers reporting on-line to the Comsat/-GE service, the source noted, and eventually, all of Pennwalt's 56 foreign centers will be incorporated.

ACS Capabilities Unlike SNA's

(Continued from Page 35)

firms such as Data 100 Corp., that have clustered controllers handling the data sent by on-site terminals. Such a concentrator would eliminate the necessity of getting a local loop for each terminal interfaced to the network. This may be why a concentrator capability has not been announced for ACS, he said.

Effect on Small Firms

The introduction of ACS will force smaller companies into corners where they can offer more specialized services, according to J. Robert Harcharik, vice-president of Tymnet, Inc., who noted that two of these specialized areas are electronic mail and private packet nets.

Tymnet has had an electronic mail service known as Ontymne for about one year. If U.S. Postal Service prices keep rising, the mail will soon cost about the same as Ontyme, he said.

Using the service, customers can send a 500-character message for about 25 cents to 75 cents depending on the location. This charge is based on the business density of the city and is not distance-related, he explained.

Private packet nets are being built by users who want the benefits of packet switching but do not want to operate on a public network. The private network is looked on as a turnkey approach for the user, he said.

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- Addressable cursor
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- Programmable underline

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Similar to ADM-1/2*

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Micom Data Concentrator Gains Compatibility With GE Terminet

CHATSWORTH, Calif. — Micom Systems, Inc. has announced an option for its Micro 800 data concentrator to enhance its compatibility with General Electric Co. Terminet teleprinters.

The Terminet 200 and 1232 printers and GE's serial interface models 310, 320 and 340 line printers incorporate a buffer for temporary storage of incoming data when the printer runs out of paper or to compensate for mechanical delays.

When unable to accept additional data, the Terminet 200 and 1232 automatically issue an XOFF command to the sending device, causing a halt to data transmission and then issue an XON command when it is safe to resume. The models 310, 320 and 340 line printers drop a "data terminal ready" notice when unable to accept additional data. Both these modes of operation are supported by the Micro 800 option.

The Micro 800 uses statistical multiplexing techniques to allow up to 16 asynchronous terminals to share a single telephone line and provides automatic retransmission on error for all terminals using the system, Micom said.

The Terminet option is available at no charge on all Micro 800 models from two-channel to 16-channel. The two-channel model costs $1,150, the firm said from 9551 Irondale Ave., Chatsworth, Calif. 91311.

Unit Finds, Fixes Errors

PROVIDENCE, R.I. — An "automatic data error corrector" reportedly able to detect and correct nearly all possible errors caused by channel noise, line dropouts and modem loss of synchronization has been announced by International Data Sciences, Inc.

The Accucom 9100 is said to accomplish error correction by retransmission of all erroneous data blocks via "a unique algorithm." Data throughput is continuous, with interruptions only to retransmit data blocks received in error, the firm added.

The device contains an encoder that organizes the data into blocks and adds an error detection code to each block at a rate approximately 6% that of the modem data transmission rate, the firm continued, adding that a decoder is included at each end of the channel to detect and correct errors with no loss of data bit count integrity.

The Model 9100 costs $2,420 with delivery promised within 30 days of order, the firm said from 10 Nashua St., Providence, R.I. 02904.

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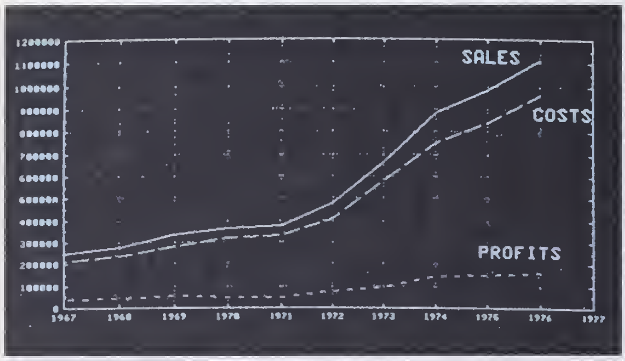
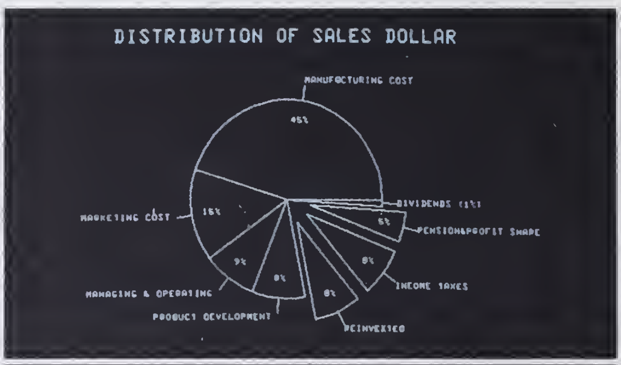
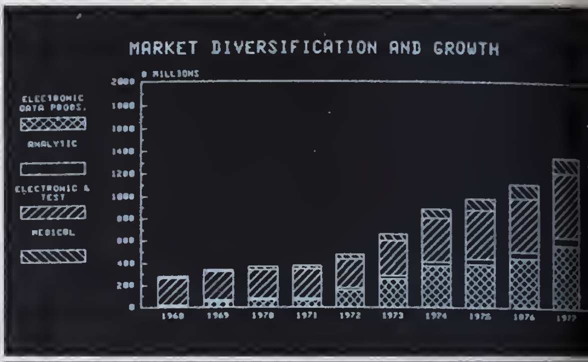
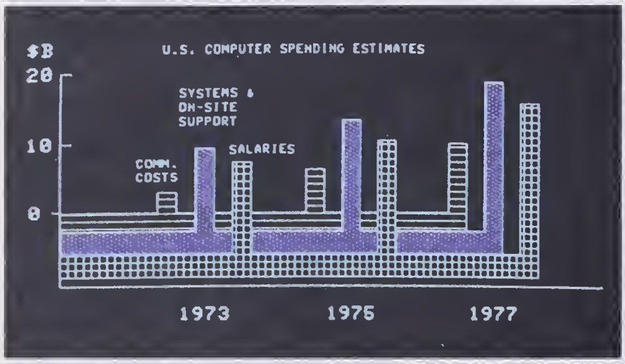
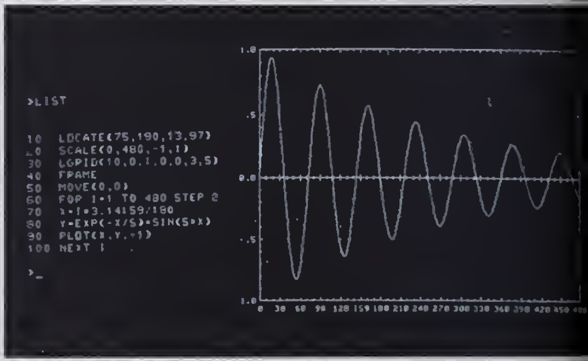


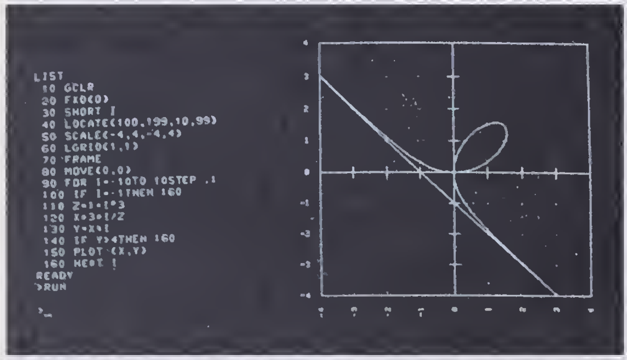




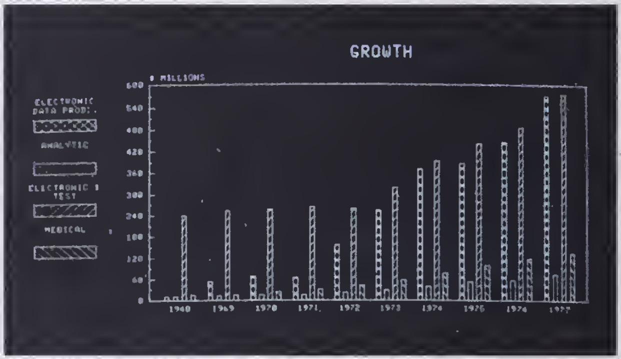


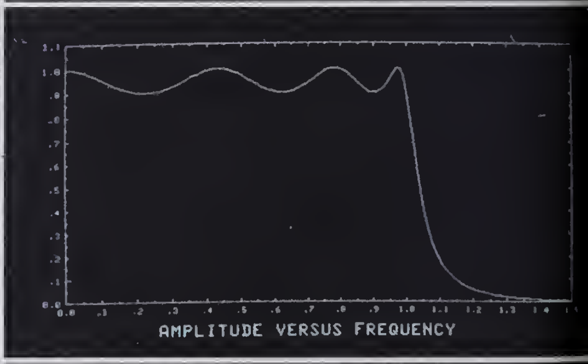


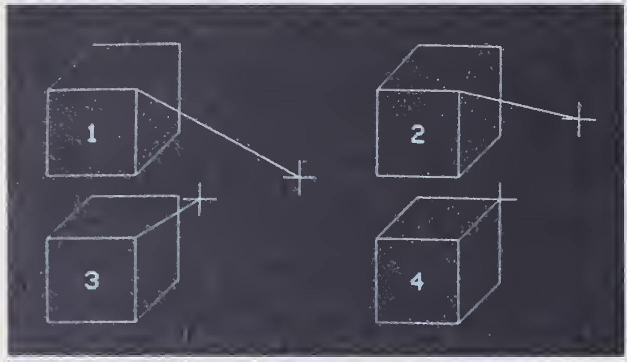
```
>LIST

10   LOCATE(75,190,13,97)
20   SCALE(0,480,-1,1)
30   LGRID(10,0.1,0,0,3,5)
40   FRAME
50   MOVE(0,0)
60   FOR I=1 TO 480 STEP 2
70   X=I*3.14159/180
80   Y=EXP(-X/5)*SIN(5*X)
90   PLOT(I,Y,-1)
100  NEXT I

>_
```

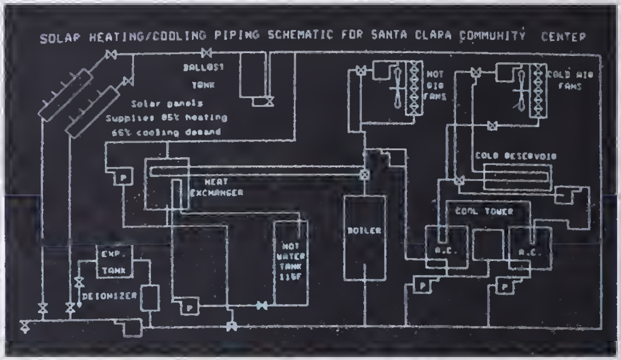


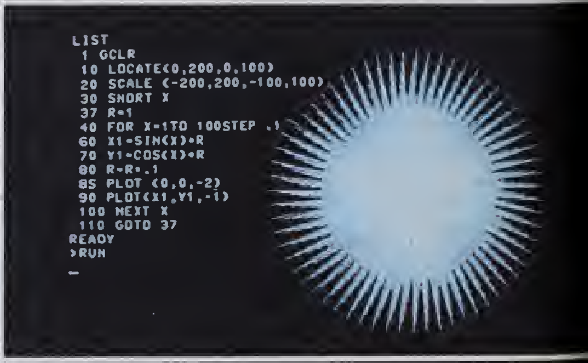
```
LIST
 10 GCLR
 20 FXD(0)
 30 SHORT I
 40 LOCATE(100,199,10,99)
 50 SCALE(-4,4,-4,4)
 60 LGRID(1,1)
 70 FRAME
 80 MOVE(0,0)
 90 FOR I=-10TO 10STEP .1
 100 IF I=-1THEN 160
 110 Z=1+I^3
 120 X=3*I/Z
 130 Y=X*I
 140 IF Y>4THEN 160
 150 PLOT (X,Y)
 160 NEXT I
READY
>RUN

>_
```



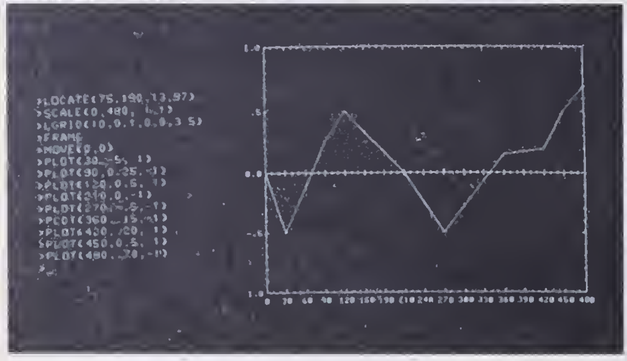




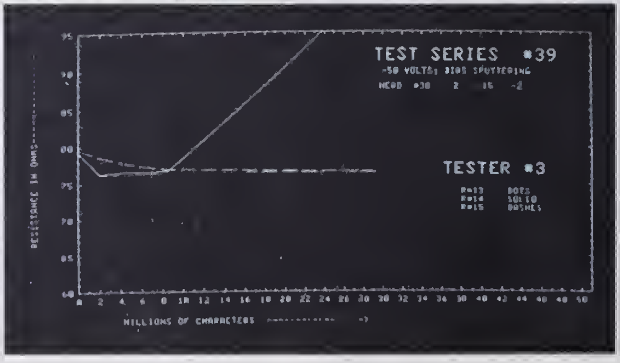




```
LIST
 1 GCLR
 10 LOCATE(0,200,0,100)
 20 SCALE (-200,200,-100,100)
 30 SHORT X
 37 R=1
 40 FOR X=1TO 100STEP .1
 60 X1=SIN(X)*R
 70 Y1=COS(X)*R
 80 R=R+.1
 85 PLOT (0,0,-2)
 90 PLOT(X1,Y1,-1)
 100 NEXT X
 110 GOTO 37
READY
>RUN
_
```



```
>LOCATE(75,190,13,97)
>SCALE(0,480,-1,1)
>LGRID(10,0.1,0,0,3,5)
>FRAME
>MOVE(0,0)
>PLOT(30,-.5, 1)
>PLOT(90,0.25,-1)
>PLOT(120,0.5, 1)
>PLOT(210,0,-1)
>PLOT(270,-.5,-1)
>PLOT(360,.15,-1)
>PLOT(430,.20, 1)
>PLOT(450,0.5, 1)
>PLOT(480,.70,-1)
>_
```



graphics software.

You just lost your last excuse for sticking with alphanumerics. Because with HP's new 2647A Intelligent Graphics Terminal, you get graphics without digging into your CPU's software.

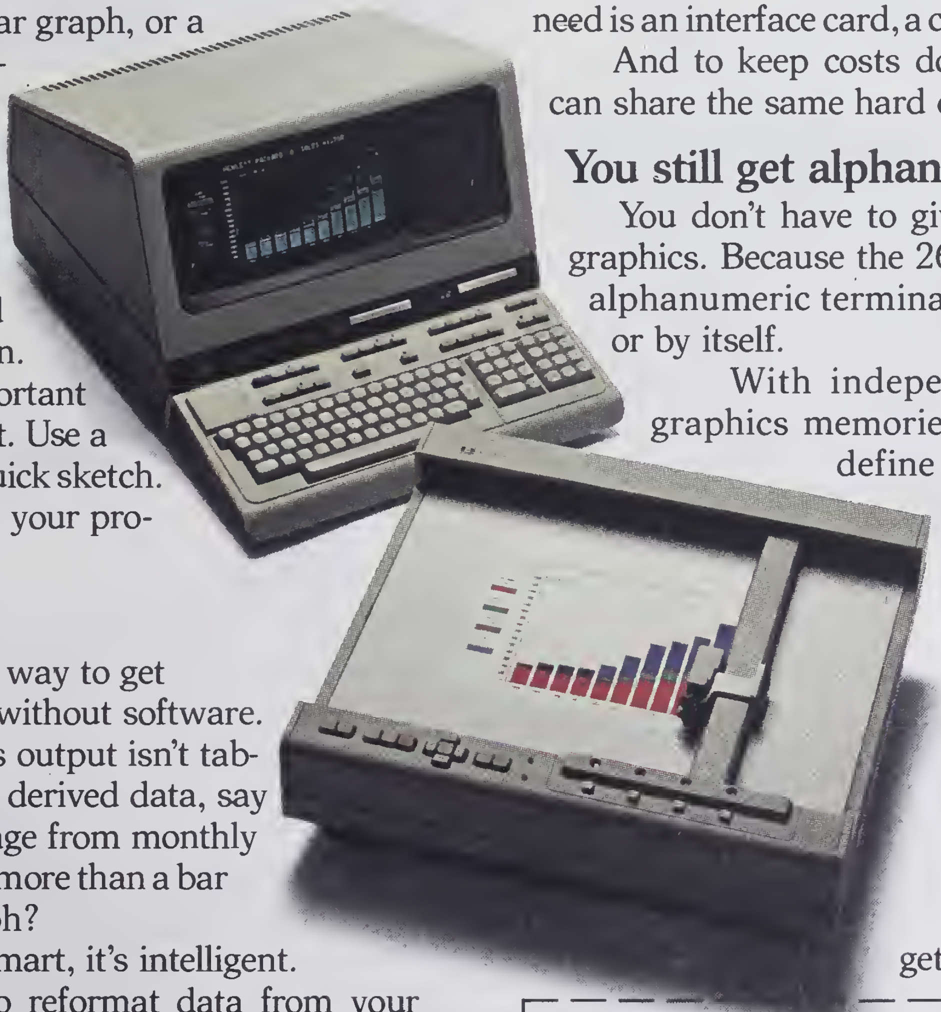
A picture's worth a thousand numbers.

On an alphanumeric terminal, your data's just a screen full of numbers. But with the 2647A you can plot tabular data as a bar graph, or a pie chart, or a linear or logarithmic line graph. Quickly, with just a few keystrokes.

Now you can really see your data, not just look at it.

What's more, with the 2647A you can zoom in and out. Pan right, left, up, down. Selectively erase. Shade important areas to make them stand out. Use a rubber-band line to make a quick sketch.

Without any help from your programming department.



It's more than smart.

The 2647A's the smart way to get graphics from tabular data without software.

But what if your CPU's output isn't tabular? Or if you'd like to plot derived data, say a three-month moving average from monthly sales figures? Or if you need more than a bar graph, pie chart or line graph?

The 2647A's not just smart, it's intelligent.

You can program it to reformat data from your CPU, or to compute more data, in easy-to-write BASIC. And you can program it in AGL, our high-level graphics language extension of BASIC. Its powerful commands, such as FRAME, AXES, LABEL, LOCATE and PLOT, put sophisticated graphics at your fingertips.

Either way, your program runs on the 2647A without any help from your CPU.

Hard copy's easy.

How do you get graphics into your briefcase?

The 2647A makes graphics as portable as alphanumerics. It interfaces easily with our 9872A Four-Color Plotter (which can even make overhead transparencies), and with our 7245A Thermal Plotter-Printer. All you need is an interface card, a cable and the peripheral itself.

And to keep costs down, more than one 2647A can share the same hard copy peripheral.

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You don't have to give up alphanumerics to get graphics. Because the 2647A's also a programmable alphanumeric terminal for interactive use on-line or by itself.

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OCR Reader Fits More NCR Units

DAYTON, Ohio — The NCR Corp. 7867 optical character recognition (OCR) wand reader, which automatically scans merchandise tags printed with the OCR Version A font, is now available on additional NCR terminals.

When introduced last year, the hand-held, pistol-shaped device was offered with the NCR 280 retail terminal and the NCR 250 electronic cash register.

NCR is now making this system available with the models 255 and 2552 checkout terminals and with the NCR 2151 retail terminal "as a natural extension of automatic OCR reading," according to an NCR spokesman.

The models 255 and 2552 are designed for use in high-speed, mass-merchandising environments such as discount stores and supermarkets. The terminals can also accommodate Universal Product Code scanning systems, which automatically read the bar-code symbol now printed on most food store items.

In addition to reading merchandise labels and tags printed in OCR type font, the hand-held device can read employee badges, credit cards and other media printed with OCR, the spokesman added.

The reader costs $1,500 and is available for immediate delivery.

Telenet Extends Packet Service To Austria, Italy and Hong Kong

WASHINGTON, D.C. — Telenet Communications Corp. has inaugurated packet-switched service between the U.S. and Austria, Italy and Hong Kong.

Access to the Telenet packet network is now available in 18 countries and U.S. overseas points, the firm said.

Telenet's international service enables overseas terminal users to connect on a demand basis to computer systems using the network. The service is approved by the overseas telecommunications administrations and the U.S. international record carriers.

In Austria and Italy, overseas connections to U.S.-based computers are provided on a dial-up basis by Radio Austria and Italcable.

Rates for service from Italy average $17/hour; and from Austria, $49/hour. In Hong Kong, hourly charges average $27/hour with a $100/mo charge for a leased line and modems, Telenet said from 1050 17th St., N.W., Washington, D.C. 20036.

Modem Suits Short Hauls

WHEELING, Ill. — Gandalf Data, Inc. has introduced the Model LDS 309 synchronous short-haul modem, designed to operate at 9,600 bit/sec at up to eight miles on four-wire dedicated circuits with characteristics similar to unconditioned and nonloaded data channels.

The modem provides selectable data transmission at 2,400-, 3,600-, 7,200- and 9,600 bit/sec, Gandalf noted, adding the device features an RS-232C or CCITT V.24 interface to business machines, and does not require dc continuity.

The modem also features phase-lock loop, data scrambling, signal quality monitor, controlled or continuous carrier operation, point-to-point or multipoint transmission and internal or external clocking.

The 9,600 bit/sec LDS 309 costs $635, while a second version operable at 14.4K bit/sec and 19.2k bit/sec costs $685, Gandalf said from 1019 S. Noel, Wheeling, Ill. 60090.

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Device Aids Terminal Cluster, DEC CPU Ties

GOLETA, Calif. — An intelligent concentrator for remote clusters of asynchronous computer terminals connected to such Digital Equipment Corp. systems as the PDP-11 minicomputer series has been unveiled by Comdesign, Inc.

Without software changes to the host CPU, the TC-3 concentrator allows groups of remote asynchronous terminals to be connected to DEC's PDP-11, Decsystem-20 or VAX-11/780 systems featuring the mini vendor's DZ11 multiplexer, according to a spokesman.

'Terminals Appear Local'

The terminal clusters appear to the host CPU as if they were local, the Comdesign source said, noting the data transmission rate, character format and modem control signals for each terminal are under full software control in the same manner as with the DZ11.

Efficient data transfer between local and remote units is accomplished via a Synchronous Data Link Control (SDLC)-like protocol in conjunction with statistical multiplexing and data compression, the source claimed.

In most applications, it is practical to operate eight 1,200 bit/sec terminals over one 2,400 bit/sec line, the source continued, adding another useful configuration might be seven 2,400 bit/sec terminals and a 300 line/min printer on a 9600 bit/sec line.

The SDLC-like protocol is said to permit detection of line errors and then correction of the errors through retransmission, thus ensuring no net loss or corruption of data.

'Flow Rate Matched'

Further, the TC-3 controls data flow from the computer to match the speed of the remote terminal and the effective through-put of the concentrated line, the source continued, adding "this allows the highest possible computer output speeds, but also allows quick suspension of output when desired and prevents data overrun."

One local TC-3 will support either one or two remote units, the firm said, explaining that a typical configuration consists of the local unit, which implements eight host asynchronous lines, and a remote unit.

Such a configuration costs $5,200, the firm noted from Suite A, 340 S. Kellog Ave., Goleta, Calif. 93017.

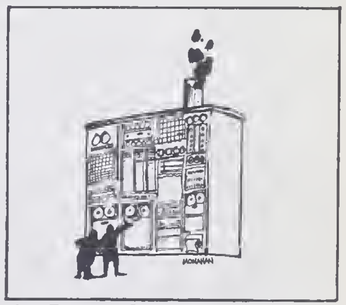
Unit Turns Printer Data Into Video

BLOOMFIELD, N.J. — A device that converts a teleprinter with RS-232C output to a CRT has been announced by Westwood Associates, Inc.

The firm's Model WA-101 video adapter accepts RS-232C teleprinter data as input and provides composite video output for viewing on any standard 12-in. monitor or video projector.

The stand-alone unit includes a self-contained power supply and projects a selectable 40 char./line or 80 char./-line, 16 line/page. The device also features a blinking cursor, crystal-controlled time base and half- and full-duplex operation and operates at 300- and 600 bit/sec.

The device runs on 110 Vac, weighs 8-3/4 lb, and costs $895, the firm said from 1442 Broad St., Bloomfield, N.J. 07003.



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Microprocessor-Controlled
Digital Tester Monitors Modem-Terminal Flow

PROVIDENCE, R.I. — A digital monitor/test device from International Data Sciences, Inc. is said to display all modem-terminal traffic (duplex, half-duplex and simplex) at the RS-232C interface.

The Hawk 4000 Datatrap can be used as a laboratory instrument or network test center data analyzer and comes preprogrammed to poll terminals, respond to addressing as a polled terminal, simulate protocols and record data from both active and passive on-line modes.

With the microprocessor-controlled Datatrap, a network manager can minimize outage time by performing diagnostics and maintenance procedures that accurately pinpoint the sources of network problems, the firm explained.

The device displays data, including two menu pages through which all preprogrammed functions are determined, on a 912-character, 9-in. self-contained CRT, the company added, noting the menu pages provide operational variables such as mode of operation, data rate, line protocol, code level and type of display.

For example, the operator depresses one of three hex keys to select the mode of operation: the 0-key for monitor mode, the 1-key for terminal or the 2-key for modem. Thus, to enable simulation of a modem, the operator depresses the 2-key on the hex keyboard. The unit then displays MODEM on the screen and indicates the next switch selection to be made. Error messages are given in the event an "improper" key has been pushed.

After the mode of operation has been established, the CRT displays monitored or transmitted data. Test messages are transmitted from a 512-character buffer by the Datatrap, which is also able to capture and replay 4K characters. The device's variable replay speed allows data scanning in three speeds in both directions of display.

The Datatrap also displays both transmitted and received data simultaneously, permitting quick analysis of protocol sequences, the firm said. Simultaneously displayed data can be interleaved by row or character or shown on a split screen, the company added.

The Datatrap can reportedly search for and trap on a predetermined character string up to 127 characters long. It has 12 event markers and four event counters and can measure event intervals from 0 to 999.9999 seconds.

For on-line monitoring, the standard Datatrap operates synchronously at up to 19.2k bit/sec with Bisync, SDLC, HDLC, X.25 and ADCCP protocols. It displays data in octal, EBCD, Field, Transcode, Baudot, Selectric, hex, Ascii and Ebcdic codes.

The Datatrap costs $9,975, the firm said from 100 Nashua St., Providence, R.I. 02904.

Terminet Units Work on TWX

PHOENIX — The Omnitec Data Model 4910 modem provides four types of transmission for users of the General Electric Co. Terminet 30 and 300 interfaces.

The modem can allow a computer terminal to serve as a teletypewriter for remote TWX-carried communications, an Omnitec spokesman said.

Further, time-sharing terminals can employ the Model 4910 to form dial-up CPU links at 10- or 30 char./sec transmission speeds through direct distance dialing (DDD), he noted.

The device also allows direct hookup for CPU front-end local communications, as well as access to the TWX/-DDD networks for multiple add-on terminals via a special RS-232 interface, the spokesman continued.

The modem provides 80 and 132 print positions, single or dual magnetic tape cassettes, 1,200 bit/sec tape transmission, automatic answer-back and originate/answer, and Touch-tone format dialing, the spokesman added.

The Model 4910 costs $788. Omnitec Data is located at 2405 S. 20th St., Phoenix, Ariz. 85034.

Micon's Pert Offers Printout Capability

OAKLAND, Calif. — Micon Industries' Printing Economy Remote Terminal (Pert) provides a 48 char./line printout capability on a continuous roll of ribbonless thermal paper.

The RS-232-compatible Pert is said to include 100- to 9,600 bit/sec data transmission rates, standard Ascii upper-case keyboard with status indicator lights and full compatibility with all standard computer formats and all standard U.S. and Canadian telephone equipment.

Options for the firm's first data communications terminal include rechargeable battery or 110V ac power, line level or acoustic coupler telephone line connect, and direct computer interface via a 20mA loop or the RS-232, a Micon source said.

Covered by a full-year warranty on materials and workmanship, Pert costs $995, the firm said from 252 Oak St., Oakland, Calif. 94607.

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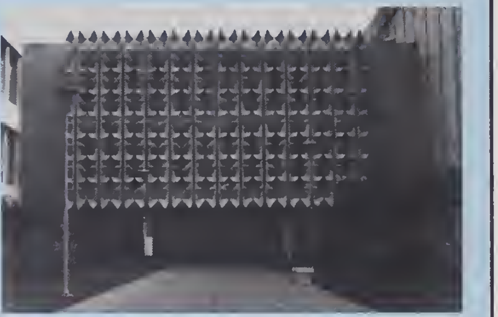
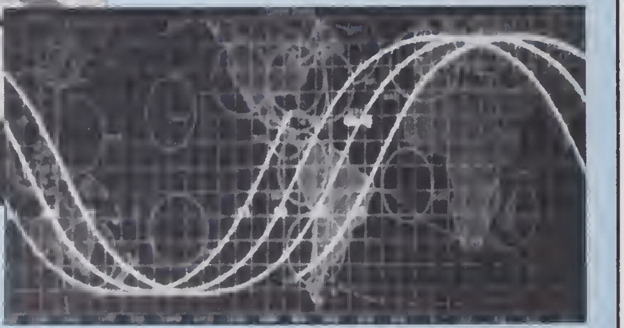

Command Center of Johnson Space Complex

Space Shuttle Control Center


Satellite Global Tracking Map

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Mainframe Jobs Offloaded

Utility Extends Scope of Data Entry

By Howard A. Karten
CW Staff

DECATUR, Ill. — When the Illinois Power Co. (IPC) here began investigating data entry systems four years ago, it looked basically for a system that would replace its keypunch machines and provide some additional functions, such as batch balancing. But thanks to the vigorous approach of the company's data entry supervisor, the system is achieving much more than just data entry.

When the equipment was installed, it provided the expected benefits, according to Sharon Dinger, supervisor of data entry for the company: an increase in the rate of keystroking per hour and a decrease in the error rate. But since then, Dinger has sought — and found — ways of extending the system's power.

"I'm working toward different things all the time, because I want it to be as good a system as it possibly can. Anything that we can do to take a job off the mainframe — that's what I'm after," Dinger said.

As part of this, she has already been instrumental in moving part of the company's accounts payable system to the Cummins-Allison series 4400 key-to-disk system and is currently investigating the feasibility of moving additional work from the company's IBM 370/158 to the data entry system.

IPC is a public utility engaged primarily in the generation, transmission, distribution and sale of electric energy and the distribution of natural gas in the State of Illinois. It serves more than 488,000 customers in the central, western and southern portions of the state.

The data entry department's work includes preparation of data primarily in three areas: customer payments, meter readings and equipment inventory updating associated with the 68 internal storerooms operated by the company. In addition, the department maintains and updates customer-oriented service records for 15 locations, repair order reports filed by the utility's staff of repairmen, mileage and usage records associated with its fleet of automobiles and construction projects.

Search for Alternatives

Several years ago, increasing costs and an anticipated increase in the demand on the department led the company to investigate alternatives to the keypunch system it was using. As part of the investigation, Dinger and other management personnel compiled a list of the criteria to be met by the proposed data entry equipment. The list was sent out to several vendors, including IBM, Mohawk Data Sciences Corp., the Entrex Division of Nixdorf Corp and Cummins-Allison Corp.

"Several of the companies came back with essentially keypunch replacements, which we didn't want," Dinger said, and these were winnowed out. Eventually, Dinger went around to several sites to get a first hand look at the equipment being proposed, and the list was further narrowed. Finally, when faced with a choice between the Cummins-Allison system and another (whose name she could not recall), Dinger chose the former.

The system now being used has 96K bytes

(Continued on Page 44)

Wise Printer Ribbon Choice, Use Can Stretch User Dollars

By Richard C. Munn
Special to CW

Today's high-speed computer printer ribbons are made from high-quality industrial nylon fabrics that are "inked" at different densities using different ink formulations. Certain applications may require the use of film ribbons with a mylar or polyester base.

Printer manufacturers specify ribbon width, length, reversing mechanism and core (or spool) size. The computer application — check printing, multipart forms, internal reports or OCR printout — frequently dictates other ribbon characteristics.

Within these boundaries, however, an operations manager has a great deal of influence on the most cost-effective use of a printer ribbon. The following suggestions are offered to help you get the most from your ribbon dollars.

1. Choose the right ribbon for your application. Nylon ribbons come in three basic thicknesses 3-, 4- or 5 mm. Five mm ribbons hold approximately 25% more ink than 4 mm ribbons and up to 100% more than 3 mm ribbons. Five mm fabric is also less expensive than 4 mm fabric, which, in turn, is less expensive than 3 mm fabric.

The tradeoff, however, is that the thicker the ribbon, the greater the character "spread" on printout. Therefore, where clarity of printout is important or where many-part forms are being printed, use a thinner ribbon.

Eighty percent to 90% of all printout applications can be handled by a ribbon impregnated with record black ink. Other inks available include silverized, purple and other colors, multilith, all-purpose, OCR and matrix. If you are not sure whether you should use a different ink, ask your ribbon supplier for his recommendation.

(Continued on Page 48)

Bank Anticipates Work Growth To Minimize DP Cost Increase

Special to CW

COLUMBUS, Ohio — The Huntington National Bank has seen a very large growth in business in the past nine years, but DP costs have not increased in proportion to growth: Total DP expense has risen only 252% as the number of accounts processed has increased by 430%. The reason for this has been the bank's anticipation of this growth in its upgrade schedule, according to Ralph H. Lockwood, senior vice-president and officer-in-charge of the Electronic Data Processing Division.

"Efficiency increases with volume — up to a point. Beyond that, we have had to look for new ways to do things. We have always tried to anticipate change instead of trying to catch up with it, and that is a big factor in our success today."

The customer base for the bank's DP division now includes 97 offices of 15 affiliated institutions throughout the state, 36 correspondent banks, 410 companies for which it

(Continued on Page 50)

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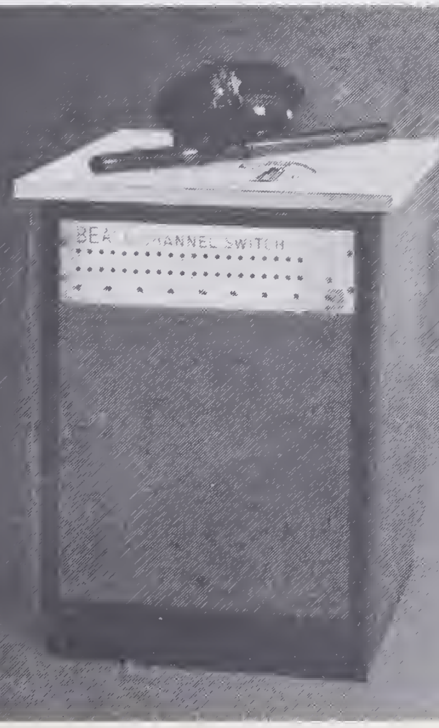

Utility Broadens Data Entry Scope

(Continued from Page 43)

of memory, a 9.8M-byte disk, 18 keystations and two printers, rated at 250 and 125 line/min., respectively. Since it was installed two years ago, Dinger says, it has performed in a "more than satisfactory" way.

'Just Fantastic'

"It's just fantastic, absolutely great. The people working for me have made a terrific adjustment to it, and I doubt that the equipment has been down for more than 15 hours in the time we've had it," she said.

As an example of how well the employees working for her have accepted the system, Digner cited the case of one woman who at first appeared reluctant to accept the change. However, after some experience with the newer system, the woman commented, "I'd never want to go back to the older equipment."

Dinger also likes the support she has gotten, and continues to get, from the vendor. "The Cummins people were very supportive and helpful in training me so that I could, in turn, train the department staff."

Expectations Exceeded

In addition, she noted, "We have found the Cummins system has met and even exceeded our expectations. Our records are cleaner, we have less trouble meeting deadlines, and we have been able to reduce staff requirements during a period where our volume has increased by approximately 20%."

But Dinger, who was formerly a secretary with IPC, isn't satisfied to just sit back and watch the work roll out. "The technical work is something different that I've never done before," she reported, and she is obviously rising to the challenge. Among the technical projects she is now investigating are the installation of a direct link between the company's 158 and the data entry system, as well as moving parts of five jobs off the 370 and onto the data entry system.

"I'm working toward different things all the time, because I want this to be as good a system as it possibly can be. We're working all the time toward getting more jobs moved to save time on the mainframe.

PDP-10s Get MOS Add-On

WALTHAM, Mass. — Cambridge Memories, Inc. has introduced an add-on memory for Digital Equipment Corp.'s PDP-10 family of processors that allows users to add up to 2M words of MOS memory.

The Stor-10S is said to be fully hardware- and software-compatible with DEC's KL, KI and KA processors and is available with a minimum of 64K words, field-upgradable to 2M words in 64K increments. Each word contains 36 bits, plus parity, plus error correction control.

The add-on memory is equipped with single, two-way and four-way internal interleaving capabilities, according to a spokesman, and in the event a hard error occurs can be reconfigured any time. Up to eight memory ports are available with the Stor-10S. Off-line switching and quad word transfer are standard features.

The memory uses 16K MOS state-of-the-art technology, the spokesman said, and offers typical access time of 400 nsec and typical cycle time of 600 nsec. All standard DEC diagnostics are supported within the system, which is completely transparent to the host system, he added.

The Stor-10S with 512K-word capacity, fully configured, is priced at $145,000, the company said from 360 Second Ave., Waltham, Mass. 02154.

Tape Transport Added by Pertec

CHATSWORTH, Calif. — A rack-mountable tape transport from Pertec Computer Corp. (PCC) features 6,250 bit/in. group code recording, microprocessor-based formatter and self-diagnostics.

The FT6250 incorporates error correction, checking and logging techniques, according to a spokesman. Diagnostics can be performed on-line by the host system or by manual selection at a keyboard built into the unit, he added.

The system features automatic, simultaneous two-track error correction and supports read-reverse, the spokesman said. The interface to the host CPU is said to be bus structured.

Available in either a 75 in./sec or 125 in./sec version, the transport was designed for Easy-Load cartridges 1 and 2 and autothreads a 10.5 in. open reel tape.

OEM prices for the subsystem begin at $13,500, PCC said from 9600 Irondale Ave., Chatsworth, Calif. 91311.

Copyholder Offers Typists Line Guide

FRANKLIN PARK, Ill. — An electrically operated copyholder featuring a pedal-activated line guide, for use by typists and word processing operators, has been introduced by Edanbob Corp.

The Kopy Trac permits a typist to follow copy line by line by using a foot pedal to move a plastic guide down a page. The hands-free operation of the copyholder can reduce fatigue and eye strain and increase typing speed of an operator, a spokesman said.

The device sells for $140 from the company at 9001 Exchange Ave., Franklin Park, Ill. 60131.

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DDP Design — Part 2

Systems Control Demands Evolutionary Approach

By Grayce Booth
Special to CW

In a distributed system, users can move parts of the information processing function into intelligent, mini- or micro-based terminals or terminal controllers, as illustrated in Figure 1.

In this type of application, the terminal controllers handle the storage and display of screen formats for data enry, as well as edit the input at the time it is entered. Using this application-specific logic, obvious errors can be immediately detected. For many users this represents the first step into distributed processing.

This is the second half of a tutorial on distributed data processing.

Some users have progressed to the distribution of all three basic function sets discussed last week (information processing, data base management and network processing), as Figure 2 illustrates. Host-to-host links connect the central information processors, while local or satellite processors perform processing and data base management at point-of-transaction sites.

This type of system also illustrates how the often encountered "80-20" rule applies to distributed processing: 80% of the total transaction load is handled by the main line processing program, while the remaining 20% of the work requires more complex processing.

Specifically, the application is partitioned so the satellite processors can handle the normal transactions, while the host processor handles the complex exceptions as well as the batch processing.

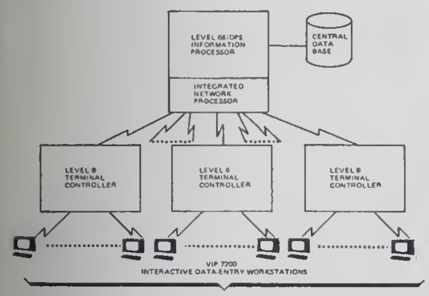

LEVEL 66/DPS INFORMATION PROCESSOR
CENTRAL DATA BASE
INTEGRATED NETWORK PROCESSOR
LEVEL 6 TERMINAL CONTROLLER
LEVEL 6 TERMINAL CONTROLLER
LEVEL 6 TERMINAL CONTROLLER
VIP 7200 INTERACTIVE DATA-ENTRY WORKSTATIONS

Figure 1

Data Base Experience

This system also provides useful experience in working with a distributed data base. A partitioned/replicated approach is used, in which the master data base is partitioned across the two hosts, while selected data elements are replicated at each satellite processor.

To keep the two copies of the data synchronized, a "flat-file" transmission technique is used, in which the data is transmitted with no pointers or position indicators.

This technique is more flexible, and usually more efficient, than a structure-dependent data base transfer, and is the prototype for a standard file transfer facility.

For each of the three function sets, system control is implemented independently and includes all administrative functions, both static (design and implementation) and dynamic (monitoring and control). Each element of system control, in turn, can be either centralized or distributed, providing many managerial options.

Control of the communications network might be centralized, for example, to provide better monitoring of overall status.

However, application development within the same system might be decentralized, to allow each remote site to develop its own specialized programs.

'Overnight' Changes Impossible

Clearly, it would be impractical and unrealistic to expect any vendor of dis-

(Continued on Page 49)

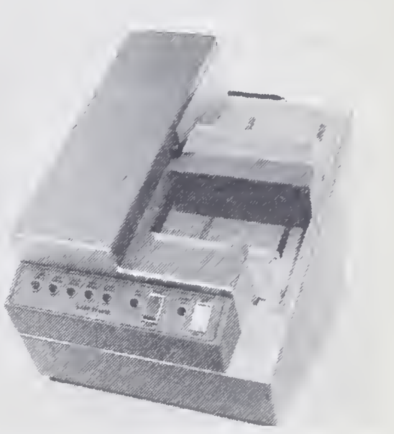
Card Reader Unveiled

PAOLI, Pa. — Cardamation Co. has unveiled a 300 card/min, 80-column card reader that has the ability to read worn or damaged cards, according to the company.

The CR 300 uses a patented vacuum feed mechanism that allows worn or damaged cards to be read with almost no jams, a spokesman claimed.

Other features include synchronous logic timing, a fiber optics read station, and self-diagnostic indicators.

The reader is presently available with a Documation interface; the company plans to introduce an RS-232C interface, mark-sense capabilities and a faster reader based on the CR 300, the spokesman added.



CR 300 Card Reader

Single-quantity price for the CR 300 is $2,875, a spokesman said from P.O. Box 81, Paoli, Pa. 19301.

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Series/1 has also increased its online file capacity almost five-fold with its new 4963 Disk Subsystem with up to 256 megabytes of online storage per unit in 64 megabyte increments.

To provide either low-cost online access or back-up storage capability, Series/1 offers the new 4966 Diskette Magazine unit.

And Series/1 now features a 370 channel attachment device that provides channel-to-channel communication between Series/1 and System/370, including the 3031, 3032 and 3033.

In all, Series/1's extensive hardware menu includes 9 rack-mountable processors, matrix and line printers, standard and customized display stations and a wide variety of I/O devices.

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The broad range of Series/1 hardware is supported by a comprehensive set of software. In addition to Fortran IV, PL/I and Assembler, Series/1 now provides COBOL, one of the most widely used commercial application languages.

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Series/1 also offers two additional operating systems. The independent modules of Control Program Support let you tailor a supervisor to your specific needs, and Event Driven Executive provides a powerful system for business and industrial uses. Available too are a variety of Series/1 programming packages to meet such needs as energy management, intelligent data entry and interactive processing.

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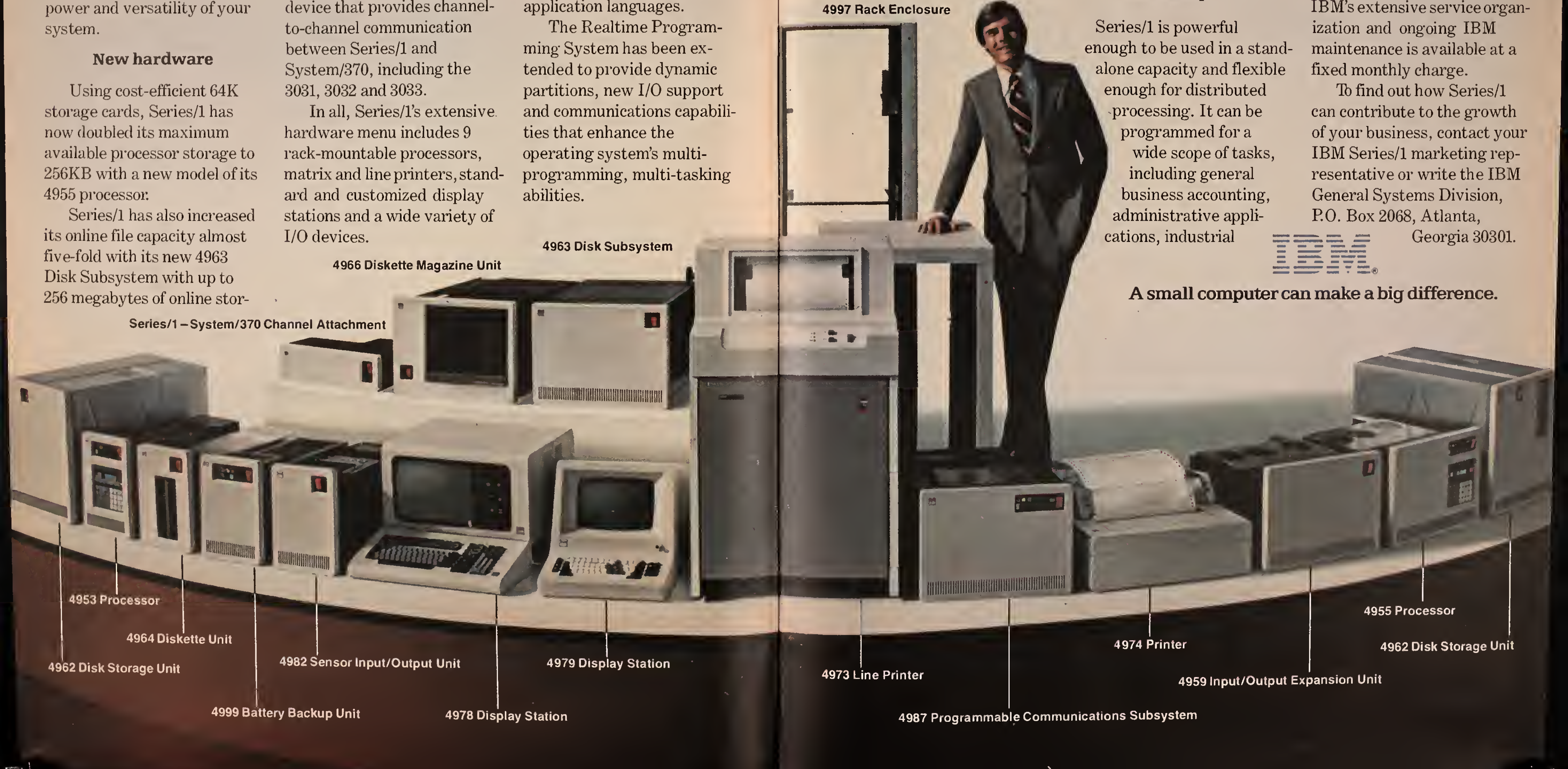


IBM

A small computer can make a big difference.

Wise Ribbon Choice, Use Can Bring Savings

(Continued from Page 43)

2. Use proper printer adjustments. Each printer can be adjusted for varying forms' thicknesses and print density.

When the printer is set for maximum form thickness and at maximum print density, the ribbon is subjected to maximum impact force which, in turn, releases the maximum amount of ink onto the paper. A ribbon's life can be shortened drastically by careless or incorrect printer settings.

Paper Finish

3. Type and finish of paper has a major effect on ribbon life. A bond paper with smooth finish will require less ink to produce a legible printout than a porous paper with rough finish. Recycled paper absorbs considerably more ink in producing legible printout because of its porous nature.

4. If you can reverse the ribbon, do so. Many printing applications are "biased" to the left. As a consequence, a ribbon normally recieves more use on its left side than its right side. By reversing the ribbon, if this is possible, you insure that both sides receive equal use.

5. Try recycled ribbons for noncritical applications. A computer printer ribbon is normally removed because of light printing (low ink content) rather than because of damage to the ribbon fabric. Our experience shows that the same ribbon can be reinked three or four times and yet produce very acceptable printout quality.

A recycled ribbon will normally last 80% as long as a new ribbon but will frequently cost not more than 50% of a new ribbon's price.

6. Don't take a ribbon off too soon. The judgment of the computer operator is a subjective method of evaluating when a ribbon should be removed. Most ribbons reach a plateau and then slowly fade off from there.

It is, therefore, important to establish a "leave it on as long as possible" philosophy unless you plan to have the ribbon reinked. In that case, it is probably better to remove the ribbon on the "early side" so that the fabric is not overly abused.

Ribbon Shelf Life

7. Use ribbons well within their recommended shelf life. Although ribbons carry a normal shelf life of anywhere from one to three years, the longer a ribbon remains in inventory, the more prone it becomes to drying out.

Try to pattern your ribbon purchases so that you have no more than six to 12 months' supply on hand at any one time. Where possible, purchase ribbons that have been vacuum sealed to ensure you obtain the maximum shelf life.

8. Choose a ribbon supplier that can provide technical assistance as well as superior ribbons of consistent quality. A lot of money has been wasted by DP departments trying to get the best "deal" on printer ribbons. If you have read this far, you probably have come to the conclusion that there are a lot of characteristics that influence the proper selection and use of a computer printer ribbon. Your ribbon supplier should be able to help you select the most cost-effective ribbon(s) for your particular application(s).

Munn is president of Compu-Rite Ribbon Corp. in Tarzana, Calif.

Printer Uses Pulsed Light

HAUPPAUGE, N.Y. — A nonimpact, high-speed printer introduced by Uppster Corp. uses pulsed light, fiber optics and advanced electrophotography to produce high-contrast printouts on standard plain or fanfold computer paper.

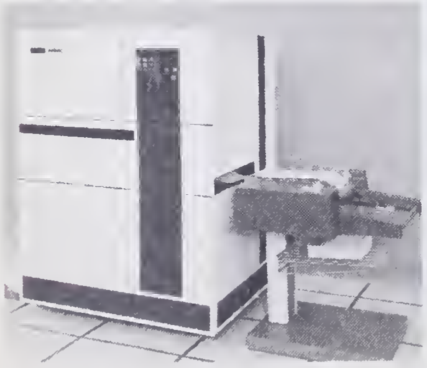
Off-Line Configuration

The PEP-6510 is available in an off-line configuration for printing magnetic tapes or an on-line configuration (without interface) for OEMs. The unit operates in burst mode, enabling it to accept data at a maximum rate of 1M byte/sec and print at a maximum rate of 13,000 line/min, or 65 11-in. page/min.

The reduced-size characters are spaced 14/in., with a vertical density of 8 line/in. Forms control can be accomplished either electronically, via the host computer, or through local switches on the unit. Maximum print-line length is 132 characters.

Printer Costs

The off-line configuration, labelled the PEP-6510-1, sells for $65,000, less than 25% of the cost of current competitive laser printers, a spokesman claimed; the on-line version without interface sells for under $40,000 in OEM quantities, the company said from 125 Marcus Blvd., Hauppauge, N.Y. 11787.



Uppster PEP 6510

System Design Needs Evolutionary Approach

(Continued from Page 45)

tributed systems to provide all the elements (hardware and software) of such a system instantaneously; it would be equally impractical to ask a user to make massive changes overnight in order to use these new capabilities.

Therefore, Honeywell Information Systems, Inc. is taking an evolutionary approach to the design of these distributed systems.

To accomplish this, each of the three lower-level architectures is further divided into functional hierarchies.

The network processing architecture, for example, involves two major functional areas, called Message Management and Communications Management. Message Management, in turn, comprises two subsidiary layers of its own, and communications management includes three sub-layers.

These individual layers are being implemented in a phased, evolutionary manner, in whcih the design of the system as a whole is a "top-down" process, while the actual implementation is proceeding from the bottom up.

This tactic makes the basic capabilities available first. More extensive features are added as the system evolves.

Link control is illustrative of this approach. This layer, which manages physical transmission over the network links, has been implemented based upon the High-Level Data Link Control (HDLC) defined by the International Standards Organization (ISO).

Currently available on HIS Level 66, 68 and 6 systems, it represents the first step in the evolution of network processing architecture and will be implemented on other members of the Series 60 in the future.

Booth is manager of Level 66 software product marketing for HIS.

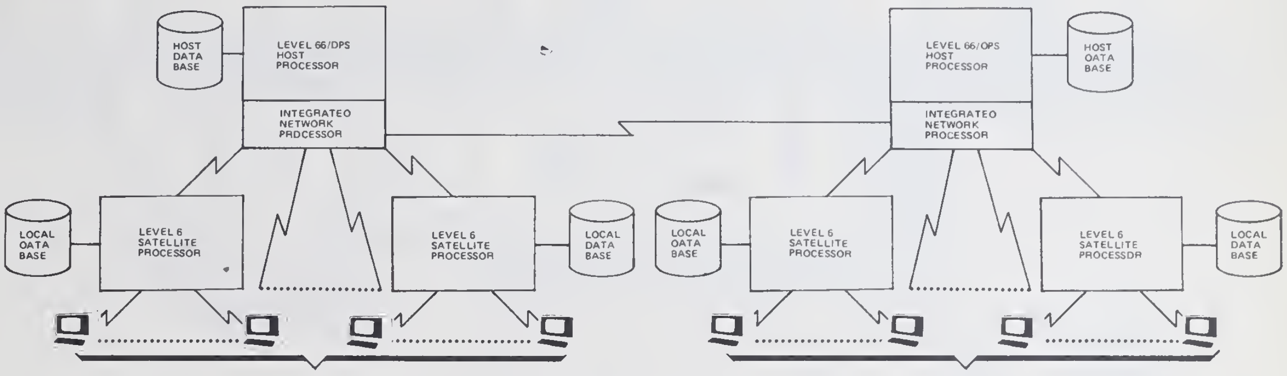


Figure 2

Versatec Adds Wide Plotter

SANTA CLARA, Calif. — Versatec has introduced a 200 dot/in., 6-ft wide plotter that is the widest high-resolution plotter ever manufactured, according to the company.

The Model 8272 can draw 6-ft-wide plots at 7.5 sq ft/min with a maximum dot-to-dot position deviation of .04 mm horizontal and .05 mm vertical. The accuracy is achieved with the use of a shaft encoder and a servo motor drive that gradually decelerates paper movement to prevent overshooting, a company spokesman said.

The plotter uses 14,336 electronic writing nibs to produce the plot, as well as a turbulent flow toner system to maintain contact between fresh toner and paper.

The device plots an entire raster scan line of data simultaneously across the paper, which enables the unit to operate faster than a pen plotter.

The Versatec 8272 plotter sells for $72,500, or $75,000 with character generator, from the company at 2805 Bowers Ave., Santa Clara, Calif. 95051.

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The S123 is the entry level system. It has the capacity to support up to eight terminal users. 144K bytes of real memory, 768K bytes of virtual memory.

The S570 can support up to 64 terminal users. It has up to 3M bytes of real memory. 12M bytes of virtual memory.

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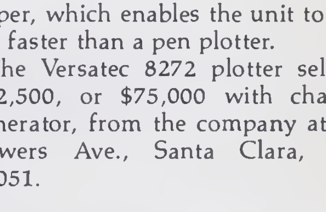

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Bank Cuts Cost Rise by Anticipating Growth

(Continued from Page 43)

prepares payrolls and several central Ohio country clubs for which it processes golf handicaps.

The bank began to anticipate growth and change as early as 1969, when the DP division began to develop an automated central information file (CIF) on a Burroughs Corp. B3500. Developed using Burroughs' Total Information application program as a base and originally intended only for savings and direct deposit account (DDA) data, the file has been expanded to contain current data on all business a customer does with the bank, including installment, mortgage and commercial loans, Master Charge and Visa, DDA accounts, checking reserve and time deposit accounts.

Since the CIF was installed, 25 additional functions have been added to the division's workload, including data communications, commercial loans and the financial information control system.

Small Staff Increase

Yet, with this increase, staff has increased by only seven people since 1969. In fact, the group that answers telephone inquiries required 19 operators when hard copy was used, but has only nine operators now. In addition, response time for this function has been cut from 2-1/2 or three minutes to about 40 seconds, on the average, even as the amount of information kept on file has increased.

Another major change took place late in 1977, when the bank replaced its three Burroughs B4700 processors with two B4800s.

The upgrade was based purely on growth, Lockwood said. Although the bank's projections indicated the B4700s would be adequate through January 1979, the same growth rate would carry the B4800s through the last quarter of 1982. In addition, benchmarks done by Lockwood on two CPU-bound jobs indicated the two B4800s provided at least 33% more CPU capacity than the three older machines.

Another part of Lockwood's study was computer utilization, which showed that the three B4700 systems, operating in a triprocessor environment, had a utilization of about 70%, while the two B4800s operated fully shared in a dual-processor environment with a utilization of about 85%. "By equal sharing in the dual-processor environment, we can operate with a lot more information at less cost," Lockwood said.

Expanded Communications

Another consideration in the upgrade was the increase in data communications. The data center is connected to more than 500 terminals, with current volume averaging about 90,000 transaction/day. In addition, the bank expects to bring 21 automated teller terminals on-line soon, which, Lockwood believes, will significantly increase the inquiry volume. Experiments with other services currently under scrutiny may also add to the increase in message traffic.

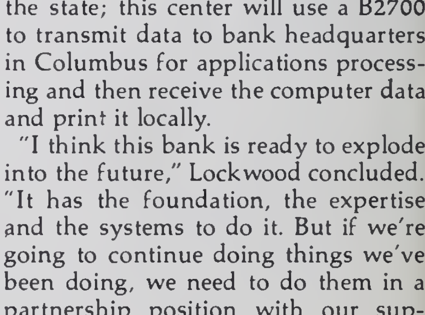
The bank's data communications activities are run by one of the B4800 processors, which also performs batch processing. Lockwood feels the system has enough memory to obviate the need for a front-end processor.

"Because the processors are fully shared, we are left with about 1M bytes for other systems. Also, because of processor sharing, if the one handling communications is down, we can switch to the other with no problem." However, Lockwood said he is not highly concerned about that, since the bank averages more than 99% uptime on the network.

Compatibility of systems has been an important consideration in the bank's upgrading. "Since 1969, we have gone through the B3500 and the B4700 without having to rewrite or recompile our programs," Lockwood recalled. "That's important, because we're operating with some 1,600 programs and to change them would be a huge, expensive task."

The bank is anticipating an increase in workload from affiliated institutions and as a result is planning to expand its operations for greater efficiency. This year, a remote operations center is planned for the northwestern part of the state; this center will use a B2700 to transmit data to bank headquarters in Columbus for applications processing and then receive the computer data and print it locally.

"I think this bank is ready to explode into the future," Lockwood concluded. "It has the foundation, the expertise and the systems to do it. But if we're going to continue doing things we've been doing, we need to do them in a partnership position with our suppliers."



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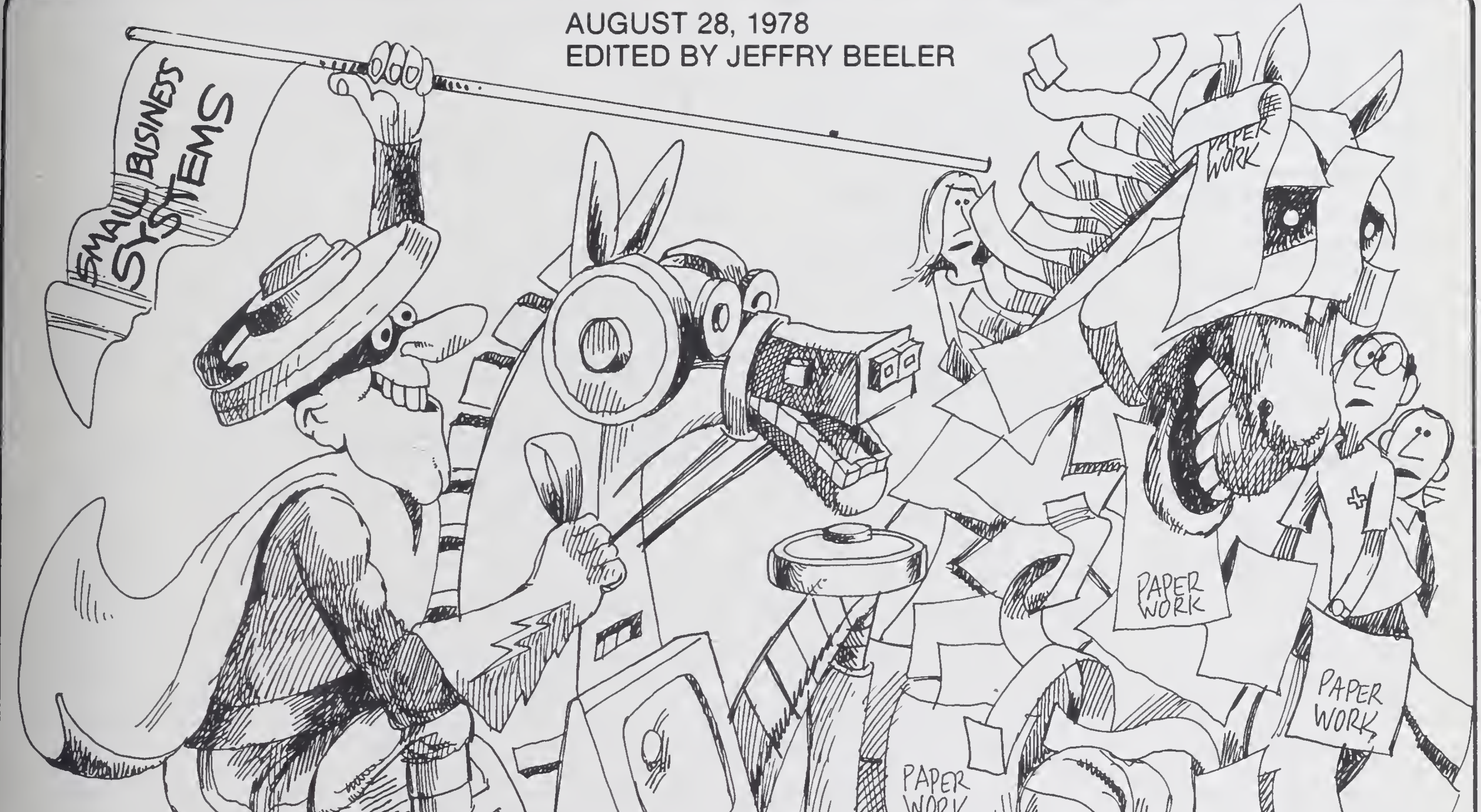
Computerworld Special Report

AUGUST 28, 1978
EDITED BY JEFFRY BEELER



MINICOMPUTERS AND SMALL BUSINESS SYSTEMS: MEETING THE CHALLENGE

Mark Milestone in Mini Evolution

Virtual Memory Aids Support, Eases Upgrades

By Murray A. Eisenberg
Special to CW

Recent product announcements, including those for the Wang Laboratories, Inc. VS and the Digital Equipment Corp. 2020, have signaled an important step in the evolution of medium- and small-scale computer systems by featuring page-oriented virtual memory management. Paged virtual memory management has been commercially available on large-scale computers since IBM introduced the 360/67 in 1966 but, until recently, has not been economically feasible for lower priced systems.

With the introduction of these systems come a number of architectural advantages that will significantly reduce technical support, software development costs and system upgrade complications.

In perspective, it should be noted that many factors significantly affect overall system characteristics such as price/performance ratio, ease of use, programmer productivity and system reliability. Many of these factors including innate processing capacity and the efficiency, sophistication, comprehensiveness, functional integration and human engineering of software services are quite subtle. Use of virtual memory management is one of many design decisions that affect system characteristics.

Its benefits, however, include efficient use of computer memory and significant contributions to programmer productivity, program transportability and system expandability.

Especially applicable to a multiuser, concurrent processing environment, virtual memory is a mapping technique between secondary storage media and available main memory which allows limited fast-access memory to be efficiently shared by large and small programs. With virtual memory, the addresses used within a program to execute instructions and manipulate addressable data are differentiated from the addresses by which the computer accesses information in physical memory.

Virtual memory systems are able to present each concurrent program with a large address space by keeping portions of that address space on secondary storage when not in use. The virtual-to-physical-mapping function is performed automatically by the operating system (using hardware facilities) without any special program preparation.

Virtual memory management is transparent to the programmer: every program is written as if it were to be run on a huge single-partition computer system.

Basic Forms

Virtual memory systems come in two basic forms — segmentation systems and paging systems.

In paging systems, available main memory is logically divided into fixed-size units called page frames. Typical page frame sizes are 1K to 4K 8-bit bytes.

Each program address space is correspondingly divided into logical units of the same size called pages. The location of these fixed-length pages on secondary storage devices, usually disks or drums, is a function of their virtual address and the secondary storage allocation scheme.

With the Wang VS, for example, the page frame size is 2K bytes; every program begins at the same virtual address X and is stored on disk as a consecutive file. Program files are located in one or more extents, each containing a number of 2K-byte blocks.

Program addresses X through X+2,047 are in the first block of the program file; program address X+2,048 through X+4,095 are in the second and so on.

When a program is run, those pages that contain the instructions being executed and the data being manipulated are read into available memory page frames on demand. The addresses used

(Continued on Page S/10)

Manufacturer Gets Control Over Its Growing Output

By William F. Ward Jr.
Special to CW

COCKEYSVILLE, Md. — Increased customer satisfaction and on-time orders, combined with sharply reduced operating costs and improved overall efficiency, have resulted from automating the manufacturing environment at Ward Machinery.

As a manufacturer of corrugated container finishing equipment, Ward has derived the following benefits from automation since early 1976:

- 99% inventory accuracy of finished parts and raw materials.
- 95% accuracy in pulling machine parts for final assembly.
- 75% fewer man hours for engineering changes.
- 60% increase in management effectiveness.
- 50% fewer man hours to issue machine parts.
- 40% reduction in production control manpower.
- 30% reduction in in-process inventory.
- 24% reduction in machine assembly hours.
- 13% reduction in direct labor costs in the machine shop.
- $600,000 savings in operating costs.

Since its founding 16 years ago, Ward Machinery has experienced steady growth. However, as the company grew, control of its production operations failed to keep pace. By 1973, the corrugated finishing industry was enjoying a boom period. But internally, the Ward production control system was struggling just to keep up with the strong demands produced by a peak sales cycle. Poor production system flow, an inadequate bills-of-material system and minimum audit trails were key problems.

In addition, many engineering changes complicated the job shop environment. Inventory accuracy was only 60% to 80%. Machine parts were pulled one to two months before scheduled assembly to allow sufficient time for purchase or manufacture of missing parts. It was a way of life which had become necessary but not effective.

Realizing the weaknesses in the existing system, Ward decided to develop a comprehensive manufacturing control system that would correct the current problems while permitting future growth.

In retrospect, Ward has succeeded beyond its original expectations. Although the corrugated finishing industry underwent a decline that has now begun to reverse itself, the firm's manufacturing systems have enabled it to produce customer equipment efficiently enough to minimize price increases, make possible an 11% drop in work force (through attrition) and absorb both a 5% pay scale increase and rising raw materials cost.

The first step was to hire an experienced DP manager, Douglas R. Munro. Under his direction, Ward began an active program to develop a control system that would draw all phases of its manufacturing environment into a tightly knit, smooth-working organization.

Four elements were needed for a successful program: an overall master plan, user participation and support, accurate information and adequate

(Continued on Page S/18)

Dramatic Shakeout Awaits Small Systems Vendors

By Ryal Poppa
Special to CW

Small business systems, more popularly known to some as personal computers, represent a major new market battleground where hundreds of firms are vying for the favors and dollars of a new class of computer users. However, some contenders, in their eagerness to seize a moment of advantage and gain a competitive edge with hardware and software advances, are overlooking the hard-learned lessons of older, wiser and more established firms in the industry.

As a consequence, of the more than 750 firms involved in the personal computer market, somewhat less than 50 of any substance will survive as long as five years.

The reason so many of these firms exist today is that it is very easy to enter the personal computing field as the technologies are relatively simple. It takes far fewer resources to design and develop systems for small business than it did to produce many second-generation systems that ironically are roughly capable to today's microcomputer systems.

This dramatic shakeout to a number one-fifteenth of those 750 firms is easy to predict because, of the approximately 700 that will fall by the wayside, most will see whatever current strategic advantage they might have had with their respective hardware and

(Continued on Page S/5)

On the Inside

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Plane Maker's Net Yields On-Line Programs

By Sol Danels
Special to CW

BETHPAGE, N.Y. — Grumman Data Systems Corp. has speeded its program development turnaround and thus streamlined its manufacturing operations with a minicomputer-based configuration that for the first time allows the firm to produce its software on-line in a multiprocessing mode.

Grumman uses the software for its line of minicomputer-based flight and weapons systems simulators, which it sells to the U.S. Navy, Marine Corps and Air Force.

In developing its latest product, a simulator for the A-6 aircraft, the company configured a stand-alone program development system built around an 896K-byte Interdata 8/32C. The problem solving techniques the firm devised in implementing that configuration could serve as a model for any systems builders that, like Grumman, must develop and test many programs and systems simultaneously.

Lengthy Turnaround

Systems manufacturers have found they are no longer able to tolerate long turnaround times for updating, compiling and testing of single programs.

Previously, such work was relegated to the second or third work shift. However, because of the cost of program development, this task must be given equal status with production programs in vying for computer time.

The one way this contest can be satisfactorily resolved is through on-line program development in a multiprocessing mode.

The evolution of this multiprocessing capability in a minicomputer has recently produced startling cost reductions over earlier mainframe systems. One of the most cogent comparisons is between the Interdata 8/32 with multiterminal monitor (MTM) configuration and the IBM 360/370 series with OS/MVT/TSO.

Each vendor's system offers interactive time-sharing and simultaneous batch and teleprocessing operations. With either machine, programmers at remote terminals concurrently create, modify, store, compile, debug and execute programs in Cobol, Fortran and machine assembly language. Both 32K-bit machines support Fortran programs as large as several 100K bytes.

The differences are interesting. The IBM systems require a minimum of 524K bytes; the Interdata machine, 256K bytes; the IBM CPUs offer 14 terminals; the Interdata machine, 16 terminals. The IBM equipment has slightly more file management and telecommunications features, but Interdata's 8/32 capabilities are sufficient for most customers needs.

These trade-offs, with cost comparisons, were considered when making a machine choice, but the underlying decision was based on machine compatibility with existing simulator equipment. These facts made the Interdata hardware the choice for Grumman's simulator application.

Simulator Functions

Grumman builds the A-6 simulator to provide a realistic environment to train replacement flight crews and to maintain the proficiency of operational flight crews. Designated the A-6E Weapon System Trainer (A6E-WST), it permits flight training with no risk to flight crew or aircraft.

In addition to functioning as a weapons systems trainer, the A6E-WST serves as an operational flight trainer (OFT) or tactics trainer (TT). When the system is used as an OFT, pilots can be trained separately in aircraft control, communications and normal and emergency procedures.

When used as a TT, the system gives bombardier navigators separate training with an attack navigation system, including radar scope interpretation, communication, navigation and normal and emergency procedures.

The variety of the simulator's capabilities necessitated complex and intricate software, developed by a large staff of software engineers. The staffers included personnel from Grumman Data Systems, Grumman Aerospace and outside contractors, as well as Interdata employees.

In attacking the problem, Grumman

(Continued on Page S/12)

Many Variables Complicate Printer Selection Process

By John Henry
Special to CW

In selecting a printer for a business information system, end users are deluged with conflicting claims from various manufacturers, all of whom proffer widely differing criteria which they insist are the essential factors that should be considered before a final decision is reached.

Not surprisingly, firms whose products are low in price tend to stress initial cost as the primary consideration. Companies whose products cost a little more but possess relatively high reliability like to talk about mean time between failure and the like. Manufacturers whose products are very high in speed stress performance.

Finally, international firms concentrate on their worldwide maintenance and service network in the hope prospective buyers will consider this factor to the exclusion of all others.

Which of these approaches is correct? Which standard should end users apply in their own situations? The answer is all of them — and more.

The buyers of a printer must be concerned not only with the purchase price, reliability, performance and speed, but also with more mundane matters such as the best type of printer for their use (serial dot matrix or line, impact or nonimpact, etc.), the number and type of options available and the reputation and integrity of the vendor — factors that affect the total cost of ownership.

Therefore, to assist those who are currently considering the purchase of a printer or who may do so in the future, here is a list of questions that users should ask themselves when evaluating a prospective vendor.

• *Is this a reputable vendor? Do I know or can its representative refer me to any satisfied customers?*

Printers are expensive. When you buy one, you want to be sure that the vendor will still be there when and if service is needed.

One of the best ways to ensure reliable service is to purchase the printer from a firm with which you are familiar, a firm that stands behind its product, not one that is likely to run from it.

• *Is this vendor financially sound? Does the firm have the ability to make the heavy investment in R&D so essential in this industry?*

You'll want to be sure that the company you select is a leader in state-of-the-art technology today and that it has the potential to be a leader tomorrow as well. You'll want to select a company that can assist you in your expanding requirements for tomorrow's needs.

You'll also want the security of knowing that the manufacturer of your printer is constantly seeking innovative ways to allow you to enter new market areas and applications.

• *What type of printer is best suited to my needs right now? What about five or 10 years from now? Does this vendor offer larger, faster units and/or units with application features suitable to my needs?*

No one, not even yourself, knows for sure how fast your business will grow. It's entirely possible that a few years

(Continued on Page S/4)

DBMS Now Powerful Tool For Small Systems Users

By Dick Hanson
Special to CW

FORT COLLINS, Colo. — During the past decade, data base management (DBM) has become a powerful data manipulation tool for large-scale computer users. Only recently, however, with innovations in hardware, reduced system costs and the refinement of large-systems DBM has the tool become technically and economically feasible for small business computers.

There are currently some three million companies in the U.S. with annual sales between $500,000 and $25 million. Of these firms more than one million are expected to install computers during the next 10 to 20 years.

While many of these companies will be able to afford larger systems, the majority no doubt will look toward small business computers ranging in cost from $15,000 to $60,000 to take care of their DP needs. DBM, however, will enable small business computers to be utilized in the most cost-effective way.

A data base is a collection of related data files that contain name and format information for data items and a description of the interrelationships between these items.

A data base management system (DBMS) is a combination of software and hardware that allows a user to define a data base structure and establish a data organization. A DBMS also manipulates the contents of a data base by storing, retrieving, deleting, modifying and sorting data. In addition, such a system ensures data security through password protection.

DBM with small business computers offers numerous benefits to end users.

DBM separates data storage and access from application programming and performs all data base housekeeping. These features allow faster and less expensive development of applications.

With DBM, system designers need only worry about establishing data names and logical structures when developing or customizing application solutions and need not worry about coding complex file access methods. This fact is especially important for small business computer users, because the high costs of application development and customization have sometimes stifled the design and mar-

(Continued on Page S/6)

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Now Powerful Tool

Printer Users Face Maze of Selection Criteria

(Continued from Page S/3)

hence, the unit you select will be totally inadequate for your needs. You may wish to upgrade your system with a larger one so it will handle heavier workloads.

It would be very convenient, not to mention economical, if you could accomplish this transition without changing suppliers.

• *What about delivery time?*

Delivery lead times are of prime importance in today's expanding business. It's extremely difficult to predict how fast your business will grow.

As a result, you will want to select a manufacturer that can respond rapidly to your expanding business requirements. Missed shipments means missed revenue.

• *What about print speeds? How important is speed to my application?*

Remember that when you decide to buy a printer, you're doing so with the intention of saving money by reducing your operating costs in the long run. To buy a low-cost unit not capable of performing all the tasks you want is pennywise and pound foolish.

Printers are usually classified as low-, medium- or high-speed, and several manufacturers offer a variety of products that cut across these lines.

In general, your choice of print speed, and format is determined by your application. Regardless of its nature, there is a product out there that will fill your needs.

• *What about options? What are my choices relative to character sets, line widths and forms handling?*

Most manufacturers use the 64- character Ascii set as standard on all printers. The larger firms also offer a variety of optional sets, as many as 60 or more in some instances.

In a serial dot matrix printer, the pattern of the dots determines the size and clarity of the characters. Most machines will have a 5 by 7 pattern as standard with 7 by 7, 9 by 7, 7 by 9 and 9 by 9 as common options.

In line printers, which usually produce fully formed characters rather than letters composed of individual dots, character sets of 48, 64, 96 and 128 are often available.

Most printers produce 132 char./line, either as a standard feature or as an option.

One way to cut costs on almost any printer is to opt for 8 line/in. or more instead of the standard six. While such a decision will result in copy that is not quite as easy to read, it will also reduce paper expenses by as much as 25%. Many firms using forms not preprinted might wish to specify this option.

• *How do serial dot matrix printers differ from line printers?*

In contrast to full character printers, which form an entire character in a single stroke, dot matrix printers create their symbols by combining dots in different patterns. Hence, they offer an advantage over fully formed character printers in that font design changes are easily accomplished.

These changes involve simple electronics modifications under computer control rather than cumbersome, time-consuming, operator-conducted changes.

Today's business community also recognizes that more than 70% of all computer printouts are internal distributions, the primary consideration of which is content, not character-shape.

Improvements in matrix printing techniques, which have lowered costs and increased both performance and flexibility, have eliminated almost all the initial objections to this style of printing. Matrix printers provide timely information and require a minimum capital expenditure — two factors of paramount concern to potential users.

• *What are some of the important considerations when selecting a line printer?*

Different manufacturers, of course, make conflicting claims about the relative merits of their printers, but in general factors such as capability, reliability, price, print quality, operational simplicity and maintainability determine the overall value of a printer.

Of these, print quality ranks at or near the top as an important consideration.

John Henry is vice-president for marketing at Centronic Data Computer Corp., Hudson, N.H.

Less Than 50 Firms Will Last

Small Systems Market Nearing Big Shakeout

(Continued from Page S/2)

software achievements vanish. The primary reasons for withdrawals will be a lack of necessary capital, distribution channels, or maintenance and support.

Perhaps it will take only one factor, because each, in itself, is a significant requirement for any company. More likely, though, it will be a combination of these requirements.

Constraints imposed by capital availability have spelled doom for many fledgling companies. In today's harsh climate of investment — contributed in part by tax disincentives in the current capital gains tax structure — it takes a well-funded company to survive.

Many companies such as those reaching a barrier to their growth imposed by too little cash or credit are finding they must turn to foreign sources of money or pay extremely high prices in today's capital markets.

Others find their balance sheets, in a tough, competitive environment for limited funds, aren't sufficiently attractive for them to compete with larger or more stable firms.

The net effect is that within a very short period, capital-short firms reach a premature upper limit and, unwilling to lose control to foreign investors or pay prohibitive capital prices, must settle for an ever-diminishing share of market and eventually loss of their business. Another view — and one that is healthier for the overall outlook of the computer industry — is their eventual merger with other companies that possess similar technologies and capabilities.

Product Distribution

The second determinant of success or failure hinges on product distribution. Traditional computer marketing provides only part of the answer.

Sales calls like those used by larger-scale systems firms are far too costly for products that average $10,000 per system. Price erosion will continue because a small business system is dependent on many of the same technologies as larger systems' memories and logic circuits. As this erosion occurs, the cost per sale as a proportion of the net price will become larger and make it unprofitable to merchandise lower-ticket items in this fashion.

Applying some of the lessons learned from other areas of the electronics industry we see a need for more showrooms and demonstration centers that are readily accessible to the buyer. Typically, a prospect for one of these systems might make six to eight visits to a retail outlet before a sale is concluded.

The computer center concept started two years ago and has grown rapidly. The most successful are those that are emerging as local business systems centers similar to the general business equipment store. These centers are adding the personal sales dimension to hands-on testing of the system and perhaps even short-course instruction in using the system.

As an additional benefit to shopping at a retail computer center, the potential purchaser becomes part of the traffic at a hub that also includes a new breed of computer professional: the independent programmer. This individual might be moonlighting or might be a consultant trained in the languages of small business systems. The individual's skills might even encompass hardware integration as well as software integration.

In fact, a major business opportunity is developing. By combining a systems-consultant and temporary-help approach, the customer can hire a programmer by the hour, and the programmer can also hire out by the hour, each party more or less on its own schedule.

When a user has to add something to a small business computer, the store that sold the system or the analyst-for-hire is called, and someone is

(Continued on Page S/18)

Larry Eaton, General Sales Manager
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College Gives High Marks to First On-Line Unit

Special to CW

AUBURN, N.Y. — How can a small community college — or any educational institution, for that matter — meet the growing DP needs of its academic and administrative sectors and yet hold the line on spending?

At Cayuga County Community College here, administrators accomplished that feat by replacing their second-generation batch-processing system with a fourth-generation multiprogramming minicomputer that has expanded the school's DP capabilities while costing hundreds of dollars per month less to operate than its predecessor.

"We were primarily interested in multiprogramming," William Swartwood, the college's DP manager, recalled. "Now if we have a report that's needed immediately, we can do it, and some of our longer runs can overlap.

"We can do time-sharing, student compiles and administrative processing concurrently," he pointed out.

The school boasts a course in Level II Basic, a computer language students can work with in real-time on up to five CRT terminals. With Basic in the curriculum for the first time, the college offers an assortment of computer languages, including Fortran, Cobol, Neat/3 and RPG-II, all important for a school that offers an associate degree in DP.

While the students solve their classwork problems on-line or in batch mode in a "hands-on" environment, administrative jobs are processed without delay. Only since the acquisition of the multiprogramming system have different areas of the college achieved equal DP treatment.

Schedule Overlapping

Previously, the college had leased an NCR Corp. Century 200 computer, which it had used since 1970. With an enrollment of some 1,600 full-time day and 1,110 to 1,200 evening students and a faculty of 190, the college had grown in the years since the Century had been installed. Demand for computer time had also risen.

As a result, to the distress of users, frequent schedule overlapping occurred. When computer laboratories were scheduled, some long-running administrative reports were delayed.

The payroll also was held up a few hours at times when there simply was no block of time available for processing.

But these delays can be characteristic of a batch-processing computer. "We were inputting and batch processing later," Swartwood said. "We wanted a faster turnover for both the administration and students. The computer did not run at night, so they both had to share operating time. Both parties suffered."

Thus, in 1976, just before termination of the lease on the existing computer, a selection committee was named. It represented the different interests in the college and included Swartwood; programmer Daniel Francis; Donald Fama, chairman of the mathematics department; William L. Barth, professor of business; and Martin J. Wisniewski, registrar.

The selection committee recommended that a multiprogramming computer with CRTs for on-line processing be sought. An important proviso was that cost be held to less than the monthly rental of the existing computer system.

The selection committee drafted a proposal that included more than twice the previous system's main memory and, among other upgraded facilities, five CRTs for real-time processing.

Heeding the committee's specifications, the college last January replaced the Century system with an NCR Criterion N-8450 system. Unlike its predecessor, which held 48K bytes and supported two 32 million-character disk systems, the Criterion configuration stores 192K bytes and accommodates four 48 million-character disk units.

Also unlike the Century system, the current hardware provides Basic II in a real-time mode, Swartwood noted.

Easy Switchover

Even though the college switched from a second- to a fourth- generation computer, conversion was completed during a weekend between semesters. Basic programs were up and running on line ten days after the system's installation.

One reason for the ease of changeover was the compatibility of the Century's and the Criterion's programs and the use of NCR time-sharing and payroll application programs, Swartwood said. As a result, extensive reprogramming, quite common during upgrades, proved unnecessary.

For the foreseeable future, only Basic will be offered on-line. Three of the five terminals are currently located in the computer room and one in the data center. The fifth is mobile and can be plugged into an outlet in a lecture hall. But all five are available for student use.

The other computer languages — Fortran, Cobol, Neat/3 and RPG-II — will remain in batch mode with students entering their jobs on punched cards for subsequent processing. In all, up to 220 DP, math and business students are enrolled in the school's programming courses.

William Barth, professor of business at Auburn, N.Y.-based Cayuga County Community College, wheels video display terminal to lecture hall where it will aid a computer programming course. The terminal, like four others at the college, links to an NCR Corp. Criterion N-8450.

Though assigned computer times, students have almost free rein over processing activities. Each student receives an identification number and private code. Each also is assigned a storage area in the system.

Students enter their problems into the system through the punched cards or CRT terminals. If they are working in Basic, they can solve problems on the terminal screen and get a solution on a printer attached to the unit. In batch processing, students wait for the printout.

Students' work remains on disk file until it is purged or removed at the end of the term by an instructor. Built-in controls preserve the integrity of jobs in storage even if students inadvertently destroy their own programs.

Meanwhile, administrative work involving approximately 170 active programs continues.

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Users Stand to Reap Dividends As DBMS Moves to Mini Systems

(Continued from Page S/3)

keting of flexible, small business computer packages.

By using a computer that offers DBM, a systems designer can readily develop nucleus applications that can be quickly and inexpensively adapted to specific users.

End-User Benefits

For end users, DBM can mean the availability of less expensive application packages that are more responsive to their own particular needs.

Small business problems usually involve looking at and manipulating data randomly and in many different ways. With DBM, users can ask for all instances of sales during a particular period or inquire across files to obtain sales information by salesman, state, city or other category.

In short, using DBM, users can get meaningful, fast access to facts and figures they need to run their businesses each day.

DBM is effective for numerous reasons. Because of its uniform data treatment and documentation, DBM simplifies modifications to old applications and permits the addition of new ones.

Data common to multiple applications is made available through DBM — a procedure that both eliminates the time and expense of re-creating data names and structures for each application and reduces data redundancy. Without a DBMS, computer files, such as accounts payable, accounts receivable and inventory and general ledger, frequently contain repetitive data.

Eliminating this redundancy benefits both the systems designers and small businesses.

Dick Hanson is product manager of small business systems at Hewlett-Packard Co.'s Fort Collins division.

Large Expenditures at Stake

Good Capacity Plans Vital to Distributed DP

By Robert Goldberg
Special to CW

Distributed processing and minicomputer-based systems are being called upon to handle an increasing corporate DP work load. Intelligent capacity planning for these systems is vital and involves issues that are unique to the distributed processing environment but no less important than in large centralized systems.

Three main factors have contributed to the need for improved minisystem capacity planning:

- Significant dollar value of the work being processed. Insufficient computer capacity represents a business risk that depends more on the importance or value of the processed transactions than on the size of the machine. As minicomputers are called upon to perform more and more high-value business DP, these potential risks will increase.
- Significant dollar expenditures represented by multiple-site hardware installations plus ambitious software development. Total hardware expenditures can be significant in multiple minicomputer projects. For example, a distributed claims processing system using 12 machines in the class of the Digital Equipment Corp. PDP-11/70 represents hardware costs comparable to those for a hefty mainframe. Providing too much unneeded capacity can waste substantial amounts of money.

In addition, large multisite projects often have formidable though necessary software development efforts. The cost of software plus hardware overcapacity can make a project's economics look less attractive than it really is.

- Significant functionality in the minisystem environment including support for multiple concurrent modes of processing. Minicomputer environments (as derived from their large system progenitors) have gotten too complex for a "back-of-the-envelope" analysis. With sophisticated operating systems, multiple transaction types, foreground and background processing, batch support, high-level languages, data base management systems and networking, it is almost impossible to intuitively size systems either during development or upgrade.

For example, the appropriate upgrade to an RSTS-based PDP-11/70 claims processing system that must handle 30% more claims next year might be either more memory, drum or disk. The answer is not obvious without further analysis.

Subtle Issues

Furthermore, capacity planning in the minisystem environment involves four subtle issues that do not arise in central system capacity planning.

First, a small absolute increase in workload can represent an enormous percentage change. The addition of two terminals represents greater relative growth to an in-house, six-terminal minisystem than to a central system's 600-terminal national network. If the minisystem is operating close to capacity, a modest increase in volume can lead to unacceptable response time.

Second, nonhomogeneous workload volume and workload growth in multisite systems makes planning more difficult yet more important. In a multisite system using identical software, workload volume differences imply potential hardware differences, e.g., faster processor, more memory and larger disks.

In the extreme case, instead of a single prototype site capacity planning analysis, each individual site must be studied using the parameters that characterize it. Furthermore, because a 15% annual growth across all sites might include two sites growing 10% and 20% respectively, particular attention must be paid to growth on a per-site basis.

Third, lack of well-developed, standardized performance reporting programs makes it more difficult for a central staff to keep on top of workload trends and emerging performance problems. Software monitors, accounting packages and performance data bases are (understandably) less prevalent in minisystems.

Consequently, it is more difficult for a central performance group to keep pace with trends at each site in a mutlisite system. As a result, problems have a tendency to sneak up and when they do, the procedure to determine causes is less mechanical.

Fourth, solutions to performance problems are less flexible and, even when implemented, can be rapidly exhausted. Natúral minicomputer limitations such as the various compatible processors in a family, the maximum configurable main memory permitted and the number and mix of I/O devices allowed are all constraints that interfere with reacting to problems. Even when implemented, the inflexibility of these solutions can lead to only minor, temporary increases in capacity.

Robert Goldberg is vice-president of BGS Systems, Inc., a Lincoln, Mass., consulting firm that conducts capacity planning studies primarily for large-scale systems but also for minicomputer-based projects.

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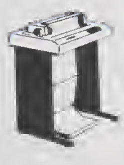
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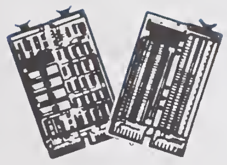
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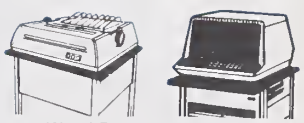
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Mini Net Simplifies Hospital Administration

Special to CW

SEATTLE — A distributed minicomputer network with 78 CRT and printing terminals is helping Virginia Mason Hospital and the Mason Clinic speed admissions, transfers, discharges, radiology services and clinical testing. The on-line terminals also aid in maintaining patient records, ordering special diets and capturing patient charges for billing by a separate computer.

The 296-bed, nonprofit hospital uses a Digital Equipment Corp. PDP-11/70 to link 56 terminals located at each nurses' station as well as in the patient medical records department, dietary services department, housekeeping, radiology, admissions and billing offices.

In the clinical laboratory, a PDP-11/10 acquires data from 17 digital and analog instruments and transmits it to a PDP-11/45 for report generation on two line printers. The PDP-11/45 also supports 22 terminals in the laboratory area.

All three computers are interconnected to permit shared resources and communications among terminals. Staff schedules, routine messages and nonemergency physician pages are displayed or printed throughout the hospital.

Previously, the hospital used a service bureau primarily for on-line business applications. Patient billing data was captured with remote CRT terminals linked to the bureau.

"By mid-1975, service bureau charges had reached nearly $4,000 per month," according to Larry O. Gardner, director of medical/management information systems at the hospital and clinic, "and the service bureau's time constraints limited us to six terminals which precluded any new applications. At that price, we could afford our own computer system."

One at a Time

It is Gardner's philosophy to undertake computer facility expansion one step at a time to ensure maximum cost-effectiveness and performance. The first minicomputer, the PDP-11/45, was installed in February 1976 with 11 CRT terminals and five printers. The PDP-11/70 was installed in June 1976; the PDP-11/70, in April 1977.

The 192K-word PDP-11/70 has one 176M-byte RPO6 disk system, one 88M-byte RPO4 disk system and a TU45 tape transport. Four DH11 programmable asynchronous serial-line multiplexers interface the PDP-11 with the terminals, while a DMC11 network link supplies interconnections to the PDP-11/45.

The 124K-word PDP-11/45 has one 176M-byte RPO6 system, one 88M-byte RPO4, one TU16 transport and two line printers. The PDP-11/45 oversees production-printing operations for the distributed network. DH11 controllers provide communications for the terminals, while a DH11 serial line asynchronous interface unit connects the PDP-11/45 with the PDP-11/10.

The 28K-word PDP-11/10 forms the heart of the programmable data logger (PDL), which operates three high-speed multi-test analyzers and 14 single-channel analog instruments. The PDP-11/10 is supported by 5M-byte dual RKO5 disk systems.

Manufactured by DEC, the PDL acquires clinical data, calculates results and routes the data to the PDP-11/45 for accumulation of patient test results and summarized reporting.

Software for the system includes DEC's Basic-Plus-2, Fortran IV, RMS11K and the PDL package. All applications software was developed by the Virginia Mason Hospital/Clinic computer services staff under Gardner's direction.

Before starting a new application, Gardner and his staff meet with hospital/clinic department supervisors and administrators to identify program requirements and define tangible costs, benefits and increased operational efficiencies.

"This, I believe, is the key to successful computer applications in our hospital and clinic," Gardner noted. "All cognizant persons agree upon and sign a written plan before the project is started. About six months after the new programs are implemented, we conduct a postinstallation review. This is truly an audit which compares projected benefits, costs and savings with actual accomplishments."

The admissions-discharge-transfer (ADT) system speeds patient admissions. When hospital care is known to be needed, patients are preregistered and room preference is noted — by treatment required, sex, private or semiprivate rooms and in smoking or nonsmoking areas.

The PDP-11/70 maintains a record of 460,000 previous patient names and associated record identification numbers. With only a momentary stop while the admissions clerk checks a preprinted listing prepared by the system, the registered patients are on their way to their rooms.

Previous patient records are kept in the correct locations. Clinical tests and radiology can be scheduled, special diet requests made, housekeeping alerted for the in-coming patient and appropriate financial arrangements made — all in advance.

Unscheduled patient admissions are equally expeditious, Gardner said. The minicomputer maintains an on-line census of hospital room availability. In private offices, receptionists enter patient data and room preference through CRT terminals. Once the data is entered, the PDP-11/70 alerts all appropriate departments in a manner similar to that for preadmitted patients.

Decwriter LA36 printing terminals at nursing stations facilitate patient transfers within the hospital, Gardner said. When a patient changes rooms, the nurse enters his name and the new room number. This procedure alerts housekeeping that the previous room needs cleaning; the billing department

(Continued on Page S/28)

Computer operator Linda Lake examines patient test results from one of 22 laboratory department terminals linked to a Digital Equipment Corp. PDP-11/45.

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Virtual Memory Feasible on Small Systems

(Continued from Page S/2)

by the program to reference instructions and access data are translated during execution from the virtual addresses used in the program to addresses within the referenced pages in memory.

When an accessed page is not in memory, a signal (usually a page-fault interrupt) is passed to the operating system to indicate that paging activity is required. The referenced page is read into an available page frame, and execution of the program is continued as if never interrupted.

When all page frames contain pages in use by active programs and a page fault occurs, one of the page frames in use must be made available. Pages unmodified since last read from disk can be overwritten without loss of information.

Modified pages must be written back to disk before their page frames can be reassigned to other virtual pages.

Segmentation Systems

Segmentation systems are similar to page systems except in the manner in which available memory is allocated. In segmentation systems, each program is divided into several variable-length program segments. Instructions and data within programs are referenced by offset within the referenced segments.

In these systems, entire segments are swapped between secondary storage and contiguous areas of memory on a dynamic basis similar to demand paging.

During execution, address translation is made by adding the known base address in memory of the referenced segment to the offset used by the program.

Segmentation systems use memory somewhat less efficiently than paging systems because variable-length allocation schemes are prone to fragmentation problems. Fragmentation temporarily reduces some unused memory areas below useful segment size.

An important advantage of virtual memory is its contribution to programmer productivity. In a virtual memory system, the operating system, not the programmer, automatically fits all executing programs to available memory. The amount of main memory in a system does not impose any constraint on program size.

The large virtual address space allows every application programmer to concentrate on the logical necessities of his application instead of system-imposed restrictions. Overlay and other program compression techiques are not required. Thus, both development time and costs decrease.

Virtual memory systems also provide flexibility for the development of transportable programs. Programs can be developed and tested with one system for use on another, regardless of target system memory size. This fact is particularly useful in distributed processing where DP functions are often replicated and programming support is frequently centralized.

In addition, systems of varying memory size can be used for backup purposes, as necessary, to ensure completion of time-dependent processing needs.

Growth Capability

Another significant advantage is growth capability. With virtual memory, the maximum number of concurrently running programs, and consequently the maximum number of users, is not dependent on memory size. This feature permits evolutionary growth in the number of users serviced and the number of concurrent applications supported without arbitrary restrictions.

As use and demand for memory increases, it can be added without any software adjustment. This growth capability protects investments in software and provides flexibility in adjusting system performance to meet customer requirements.

The freedom from address-space restrictions provided to application programmers is also an advantage in the design and implementation of system software. Systems programmers, except when implementing resident portions of an operating system, have the same freedom from address space restrictions as do applications programmers. This freedom improves productivity.

More important, though, is the potential generality of the system software.

Software Flexibility

With careful planning and necessary tuning adjustments for memory size, most system software including the operating system, the data management system, utility programs and compilers can be written for use on systems of widely different configuration size and processing capacity. Manufacturers of the software are able to concentrate on software quality rather than development of multiple systems.

Users are able to upgrade systems easily within a wide range of processing requirements, transferring programs without adjustments for varying system software support. In distributed processing, customers are able to use widely variant system sizes and configurations, as necessary, without duplicating staff for technical support and without limitations on transfer of programs from one system to another.

Another advantage of virtual memory systems is their convenience in the

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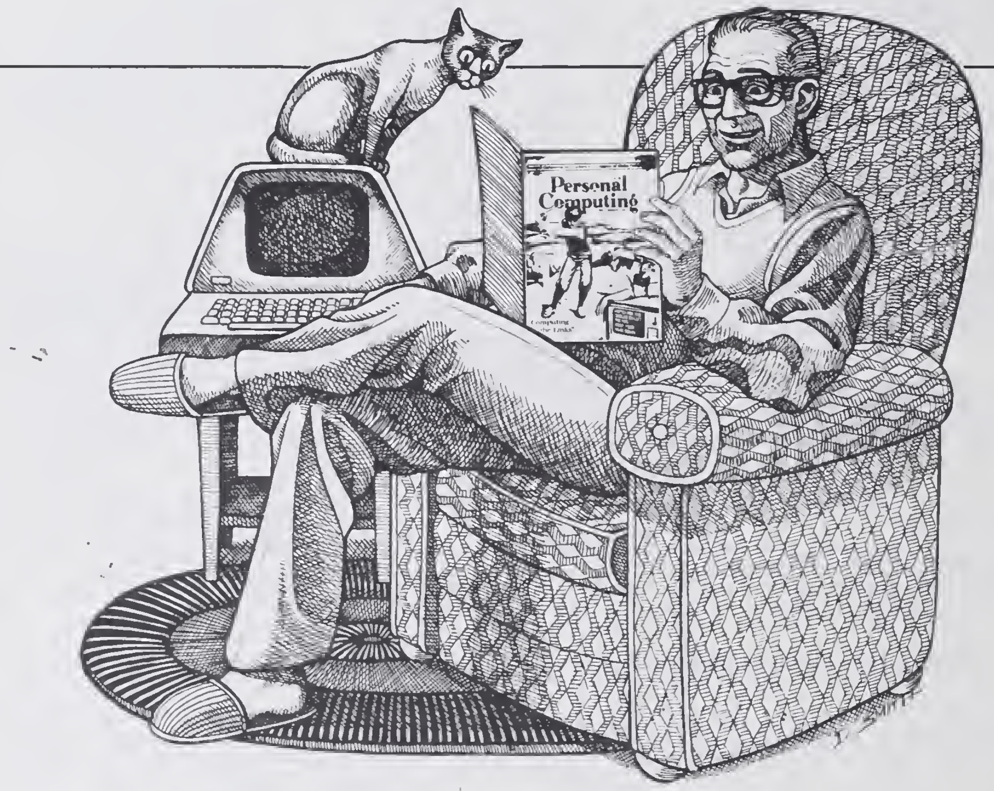

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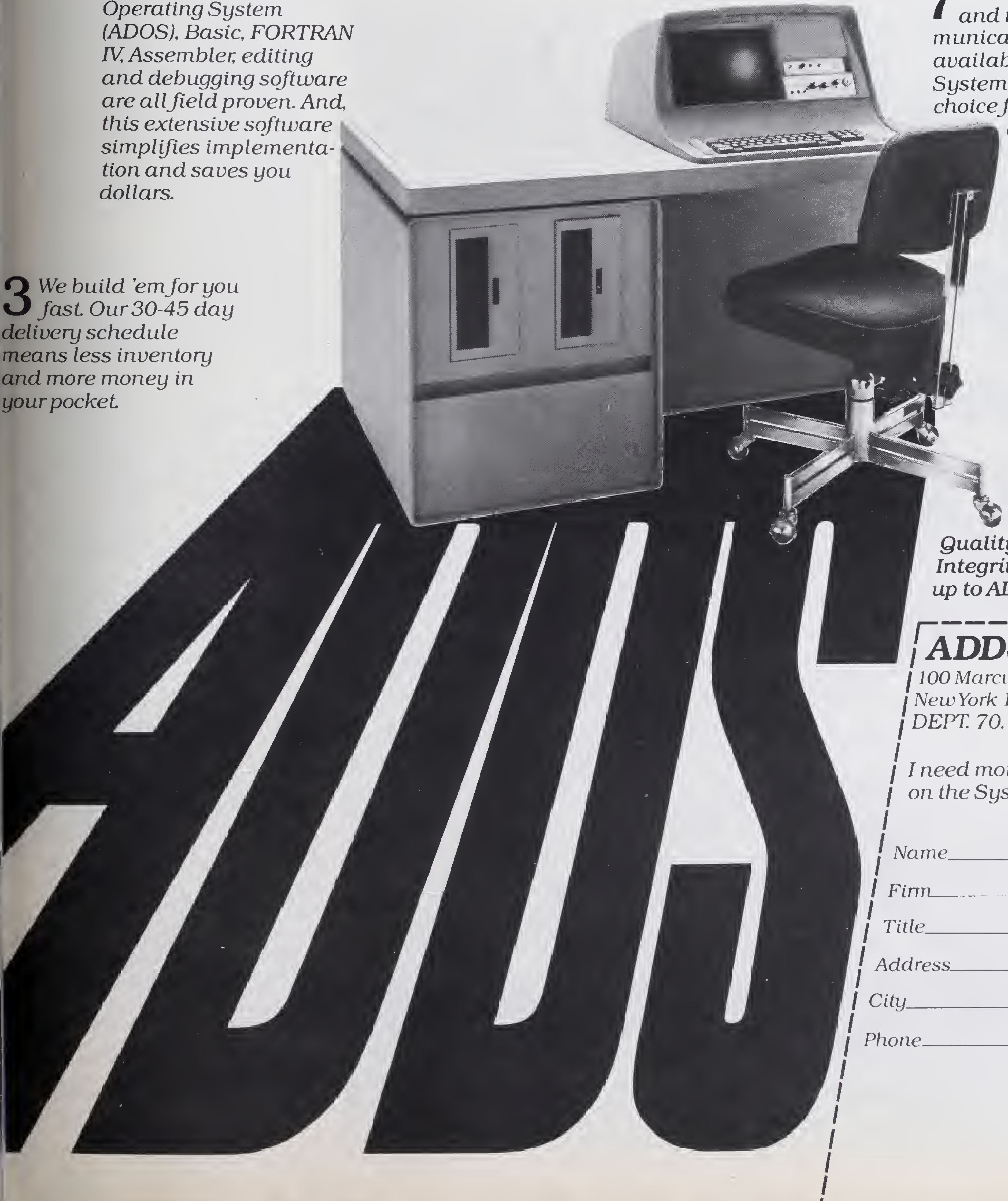

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Minis Speed Firm's Program Development

(Continued from Page S/3)

determined that the best approach for such a complicated undertaking was to develop software with a system devoted to on-line program development. But the company carried this concept one step further: program development and program testing were to be performed on separate computers.

As the development phases progressed into the test and integration phases, many of the personnel from the initial tasks could be reassigned to subsequent ones to hold down costs.

This approach is quite satisfactory for businesses delivering software to an outside customer, but it can also work for the systems being developed for internal use.

Grumman's experience with on-line program development and Interdata's MTM could be applied to any systems builder with similar programming needs. MTM features include: multiaccess program environment, interactive capability, on-line program development, batch background processing and on-line source editing.

Managing software development requires careful planning when many programming teams are involved. Grumman approached the problem by establishing a software development facility (SDF), which provides controlled development, software configuration control and management visibility.

In the SDF, source programming is prepared, edited, compiled and link-edited. It is then sent through test and integration operations where it is loaded, executed and patched as needed.

The facility is staffed by three groups — a systems group, a management applications group and an enhancement group. The systems group manager is responsible for the day-to-day maintenance, operation and minor but necessary program changes.

Working with operations personnel and the two first-shift console operators, he is concerned with such questions as: When do we change packs? Is there a problem? Is there a systems problem? Can files be moved around? The systems group manager's activities provide a framework in which programming personnel work hand-in-hand with computer operators.

The management applications group found that a need existed for specialized, control software like the header and trailer program. This program's header function places and updates within each application program, the programmer's name, identification for that piece of software and that program's change history.

It is this information which permits configuration control. The trailer portion of the management program simply counts the lines of code in the application program.

The enhancements group had the responsibility for timing improvements and benchmarking. Enhancements to trainer software have been provided by improvements in system run time by use of Interdata's writable control store (WCS) option. The enhancements group developed microcode by using WCS support packages; WCS math routines are being used to replace run time library math routines.

Microcode was generated in the 8/32 microprocessor firmware, which has a faster cycle time than dynamic 8/32C memory. Through the WCS option, the 8/32 microprocessor is used by a programmer to add instruction set pseudo-extensions, providing application functions to the system without hardware involvement.

Twelve routines, mostly trigonometric functions like sine, cosine and arctangent have been developed to improve a model's runtime. It has been demonstrated that up to 50% improvement in execution time can be achieved for some trainer models.

Earlier Systems

Prior to its Interdata 8/32, Grumman used mainframes to simulate flight functions. An IBM 7094, used for the full mission engineering simulations as part of the Apollo program, was first. Later a Xerox Corp. Sigma 5 was used with an OFT.

However, none of these programs had on-line program development — a fact that resulted in split and multishift working hours. The requirement to develop programs in a very short time with many users provided the impetus to look for a multiprocessing, interactive terminal system.

The MTM, used with the Interdata 8/32's MT operating system, supplies almost all the software support needed by the SDF. Program development facilities are available to each programmer at his terminal.

In addition to the 8/32s, Grumman's program-development configuration currently incorporates two 300M-byte moving head disk systems, eight Perkin-Elmer Corp. OWL-1200 CRT terminals, a typewriter operator's console, two 600 line/min printers, an electrostatic printer/plotter and a 1,000 card/min card reader.

To provide the flexibility and backup needed for on-line development and testing, Grumman has duplicated this system. The second system, with peripherals matching those on the first system, is configured around a 1,024K-byte 8/32. Disk and tape systems, line printers, card readers, printer/plotters and CRT terminals are interchangeable between the two systems.

(Continued on Page S/24)

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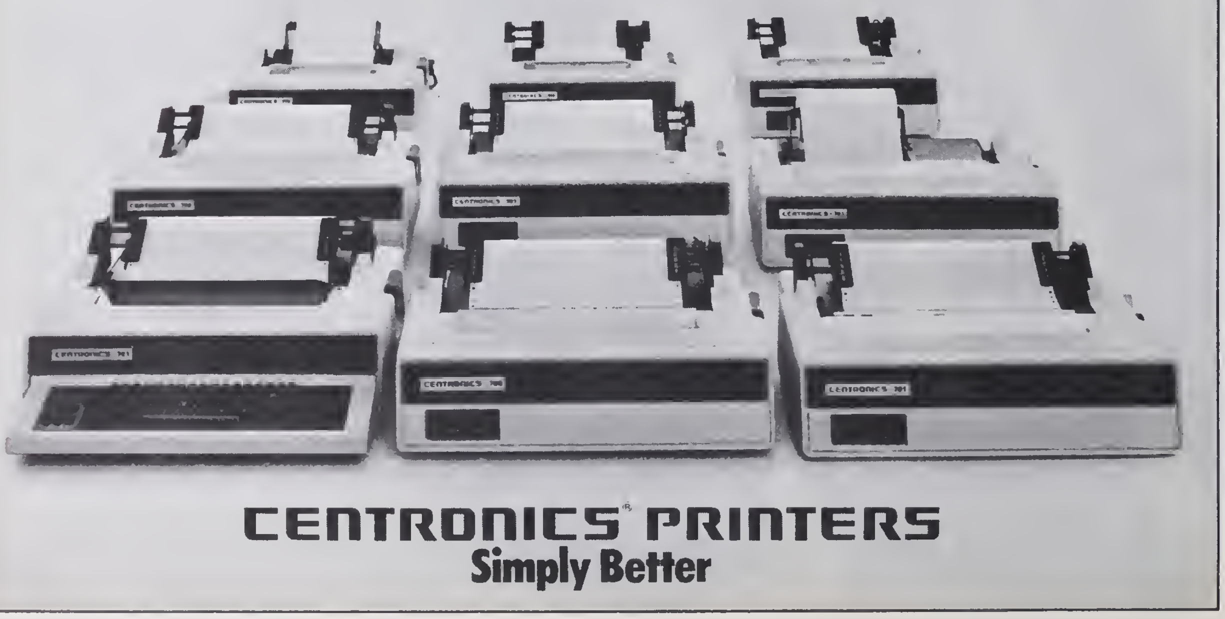

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Minis Catching Up With Maxis in Performance

By Edward J. Christiansen
Special to CW

It's no secret that minicomputer designers have borrowed system enhancement techniques from mainframe computers and have used these techniques recently to enter increasing numbers of "large-computer" applications. Many of today's medium- and large-scale minis use family-compatible architectures, CPU microcode, cache and interleaved memories and high-level languages.

Originally the domain of large computers, these and other features migrated downward as they became cost-justifiable for large minicomputer systems.

Now, a new round of improvements is helping minicomputers move into high-level DP applications. Virtual memory and data base management systems (DBMS) are turning up in large minis and making them suitable for interactive, on-line applications that require large user programs and sophisticated file-manipulation techniques.

But because these features require more elaborate computer system interaction, they — and the new minis themselves — should be evaluated not only for what they can do, but for how they do it. True DP performance means data integrity and system reliability as well as throughput and functionality, and the key to evaluating a system's reliability for DP applications lies in understanding the design and implementation of these "large computer" features.

In fact, superminis can be compared to mainframes — and to one another — in all three phases of system lifespan: before, during and after installation. Each phase, whether system design and testing, application development or later program and system upgrade, highlights different concerns of the DP user and places different demands on a computer system and its manufacturer.

New minis are taking advantage of large computer design and testing philosophies and in some cases show even greater design freedom than mainframes. Integrated software, hardware and firmware (microcode) design is the most desirable avenue to reliable large-program, multiuser processing.

Sophisticated virtual-memory, data base management and error-correction techniques shouldn't be "bolted on" to a predesigned architecture because each requires interaction among all system components for optimum performance.

Design Concepts

Large computer companies pioneered the computer-family design concept, as with IBM's 360- and 370-compatible families, and minicomputer designers followed suit. After they had designed their systems, however, mainframes had to incorporate their newer enhancements into the existing architecture.

Minicomputer companies, because of their relative newness and their faster design cycles, are not tied to "traditional" architectures. As a result, minidesigners can build enhancements such as DBMS commands into software, then fashion hardware and firmware to optimize the software processes.

The end result — processing throughput — might be the same, but many mainframes and older-design minis pay the penalty of additional costly "bolt-on" interface logic to achieve this performance, and the extra hardware can contribute to inefficiencies and vastly higher system costs.

The same is true with error-correction and data integrity features. Sophisticated sytsems use a combination of hardware parity checks, firmware test routines and software locks to protect files from users, users from users, software from hardware and even hardware from hardware.

Freedom of integrated design makes it possible for system designers to put appropriate protection into all system components at one time, rather than having to build cumbersome layers of protection onto one another to make up for old-generation design inefficiencies.

Traditional operating systems are separate, self-contained bodies of software that use protective but time-consuming interrupt-and-response sequences to maintain system control. Prime Computer, Inc.'s Primos operating system, for example, is "embedded" into the same processes it controls.

Embedding an operating system puts it closer to user programs and reduces the complexity of calling sequences to produce fast, direct interaction. It also increases the risk of accidental modification or improper access, however.

Because Primo's computer architecture was designed to accommodate software, the firm was able to build a hardware/firmware protection system into the original system design. This technique would have been more difficult in a system with a predesigned architecture.

System testing is another before-installation user concern, one where hardware-oriented minicomputer com-

(Continued on Page S/30)

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Virtual Memory Marks Milestone for Minis

(Continued from Page S/10)

implementation and use of shared.programs. Nonmodifiable program sections in memory and on secondary storage can be mapped to multiple users on demand without preplanning by any programmer or by installation management.

This capability is of particular interest in end-user installations where system tuning expertise is not usually available. For sharing purposes, all programs can be divided into a nonmodifiable section, for unmodified instructions and constants, and a separate modifiable section for variables, modified instructions and work areas.

The nonmodifiable sections can be used by any number of independent processes. The modifiable section of a shared program must be duplicated for each independent process.

Program efficiency on a paging system is achieved by maintaining good locality of reference. This fact means organizing associated data and routines to minimize the number of pages referenced per unit of time or per transaction. Frequently used and associated routines should be contiguous. Data processed together should be stored together. Maintaining good locality of reference places a burden on programmers.

However, as with structured programming, this burden is consistent with good programming technique. A well-designed, modular program is easily ordered in the manner described. Furthermore, when programming in higher level languages, some of this burden can be placed on the compiler writer rather than on the individual programmer.

Performance Determinants

Good system performance is dependent upon a reasonable match between overall paging contention and available memory. High page-frame contention causes excessive page-fault activity, increases response time and reduces data throughput.

Paging systems usually respond flexibly to increased use until page-frame contention approaches the "thrashing" threshold. When the number of resident page frames per active program falls significantly below the number of pages referenced in an average processing time slice, the number of program instructions executed per page fault falls rapidly.

Excessive paging operations consume secondary storage I/O capacity, obstruct program execution and consequently waste system processing capacity.

In worst cases, virtual memory systems are susceptible to thrashing. During thrashing, page contention is so high that pages are required from secondary storage faster than they can be provided. Response time rises dramatically, and system throughput is reduced to a small percentage of capacity.

Performance is easily tuned, however, with the addition of necessary memory. When memory is added to a loaded system, all programs experience an immediate performance improvement without individual adjustment of any kind.

Even without sufficient memory, thrashing can be limited by temporary suspension of active programs to reduce contention below the thrashing threshold. This feat is accomplished by an operating system, of course, without human interaction. More sophisticated techniques, such as working-set management, allow an operating system to determine the number of page frames required by each active program and adjust multiprogram scheduling to maximize system performance whatever the memory size.

In the past, general use of virtual memory systems has been impeded by the cost and relatively slow access time of secondary storage devices, and either the cost of hardware support for dynamic address translation or the elongation of instruction execution time. Secondary storage was too expensive to be allocated for large virtual address spaces.

Furthermore, the special-purpose, high-speed drums and fixed-head disks used to provide fast access to virtual address space were suitable for large mainframe configurations but much too expensive to be included in low-cost systems. Originally, virtual-to-physical translation was performed by using expensive associative memory or typically doubled instruction execution time.

Since that time, continuous development has significantly reduced the cost per byte of secondary storage devices. Though cost per spindle has remained relatively high, large capacity moving-head disks have become available at prices attractive for even small configurations.

The storage cost of virtual address space in low-cost, moving-head disks is now low even when compared to the rapidly falling price of computer memory. As storage costs for these disks have fallen, so have average access times — a trend that has eliminated special swapping devices.

Other improvements in hardware design and general use of firmware-supported translation facilities have reduced both the cost of and the time delay introduced by virtual-to-physical-address translation. These developments have made possible the deployment of virtual memory in lower cost systems.

Murray Eisenberg is manager of VS system integration at Wang Laboratories, Inc.

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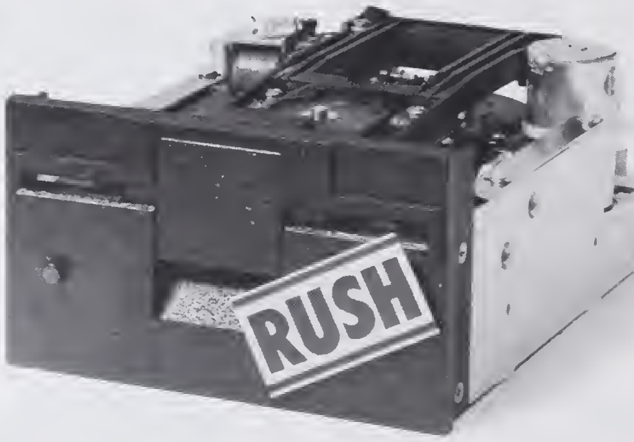

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Datapoint Official Explains

Access, Growth Top List of ARC Design Goals

By Victor D. Poor
Special to CW

SAN ANTONIO — What went into the design of Datapoint Corp.'s Attached Resource Computer (ARC) system, and what are some of the implications for users?

The first design objective was to make information stored in a business system immediately accessible, under user-configured security controls, by any processor attached to it — and, therefore, to any user.

The second was to permit such a system to expand simply by adding any required resources as needed without changing key elements of the system. Obtaining more processing throughout was to be a simple matter of attaching more processors.

More data storage was to be provided by attaching as many disk drives as necessary. Printers, terminals — in short, any conceivable system resources — were to be added as needed but without arbitrary limit.

Any ARC system divides computing into three specialized functions: applications processing; data storage and management; and communications.

In an ARC system, communications is handled by combining hardware and software in a short-range interprocessor bus managed by bipolar microprocessors. Data storage and management are done by dedicated dispersed processors attached to the interprocessor bus. Applications processing is done in other dispersed processors similarly attached but entirely unburdened by communications processing requirements.

As a result, an ARC system is — at the user's discretion — capable of indefinite expansion and almost unlimited throughput.

Decentralized Control

From its beginnings, the design aimed at eliminating reliance upon a single host computer. System control was to be decentralized, so that failure of any individual processor in the system would not bring all processing to a halt. Such a plan would also make functional reconfigurations easy since no processor in the system would be confined to a specific task or tasks.

Naturally, Datapoint was also interested in providing a growth plan for its existing customers with their investments in dispersed processors and dispersed processing software.

This objective implied that the ARC system should permit attachment of existing dispersed processors with the least possible complication and effort, using system resources at will. A single operating system command would grant them access to information stored anywhere in it.

System participation overhead would be minimal. System software maintenance would be simple and existing system procedures minimally affected by transfer to an attached processing environment. Applications programs designed for existing Datapoint systems would execute in the attached processing environment without change.

A brief review of past techniques in business DP may help place the ARC system's design in better perspective.

The first computers were single-process devices. At first no more than calculating tab card equipment, they accepted batches of input data — generally on cards, performed some process upon it and generated batches of output, after which a different program would be loaded and the cycle repeated. Long delays were common between data preparation and the appearance of results.

Of course, the first computers were never designed for business use, having been developed with military and scientific needs in view. Business DP was an adaptation of more expensive machines, achieved with as few changes as possible to their construction.

As computers became more sophisticated and were applied more and more to business purposes, it became necessary to make better use of the costly CPUs. As a result, multiprogramming operating systems were designed.

These very complex software systems allowed more than one process to use a mainframe at a time. Peripheral delays, such as disk accesses, could be overlapped with central processing activities associated with other processes.

Complex operating systems improved CPU performance, but as the number of processes coresident in the machine increased by factors of three, four, five or more, memory requirements rapidly increased too. Eventually, as total processing tasks expanded to consume every available machine cycles, the CPU would again bog down.

Meanwhile, in the attempt to gain additional features, more complex operating systems consumed greater percentages of machine cycle, leaving less time for user program processing.

As business DP loads increased toward machine saturation, the choice was to either upgrade to a bigger machine or obtain a second computer and transfer some processing tasks to it. If the latter was done, problems of common files needed by many applications systems frequently made it difficult to

(Continued on Page S/31)

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System Helps Company Cope With Growth

(Continued from Page S/2)

user training.

The next step Ward was to take was difficult to determine. Ward was aware there had to be a system's master plan that would organize events so that each segment to be developed would intermesh with all others.

For example, if a capacity load report by machine or by the machine shop was to be developed, process sheets or routings would have to be loaded into the computer. Routings would also be required for computer-generated shop paper. To accomplish this task, Ward knew that an effective system for loading and maintaining routings would have to be developed.

A capacity load report for the future was not feasible without knowledge of requirements in each period — one of many indicators to Ward that a material requirements planning (MRP) system must also be operable. Additionally, the company was aware that MRP could not function without having appropriate support systems, such as an inventory system to track storeroom transactions, receiving documents, purchase requisitions and orders.

Furthermore, a cycle count system for perpetual inventory control, a bills-of-material system to control all engineering change notices and a shop scheduling system to track shop orders were all essential supporting elements.

When the direction to be taken became clear, Ward strongly addressed several additional considerations. Primary concerns centered around user involvement, disciplines, people requirements and hardware capacity. Non-DP people, as well as DP personnel, had to know and understand the future manufacturing systems.

Planning Group

Ward organized a planning group to initiate user involvement and understanding. The group consisted of a representative from each company area that would be affected by the systems. These representatives served as designers and overseers of the systems, defined problems, offered answers and acted as liaisons with their coworkers. Their first step was to tour several manufacturing facilities to obtain a better understanding of how each company used and benefited from its systems, including MRP. Ward's idea was to return with the good points and develop its own system.

After many meetings of the planning group, Ward made one of the hardest decisions in its manufacturing system's evolution. That decision concerned the structure of the bills of material. It was to be a compromise between manufacturing and engineering. The structure was set up so that it would have a close relationship with the assembly process and be compatible with engineering's needs.

Ward also made another key decision — it would have only one set of bills — for it was aware that it was necessary

(Continued on Page S/22)

Market to See Big Shakeout

(Continued from Page S/5)

sent out who is familiar with the system. He is not necessarily the person who installed it because reliance on that type of familiarity, except in complex circumstances, will largely pass from the scene.

Along these same lines, there will be a growth in the area of what could be called cottage programming. This term refers to the professional programmer who works at home on his own computer, develops software for others to their specifications or perhaps develops software for others to their specifications or perhaps develops software solely for the purpose of selling it on a generalized basis through programming exchange services, magazine ads or a chain of stores.

Repair Service

The third determinant of survival will be the availability of repair service. This factor is very much a part of the retail center concept because the center is one place for system maintenance and support.

But in many cases, especially when the customer is a large corporation, either at the branch or department level, it will be mandatory that the user have emergency backup service that exceeds the capability typically offered by the store.

Thus, maintenance will become key in the market that deals with large corporations and will be the major stumbling block for smaller manufacturers who are operating solely through loosely connected store networks.

One reason for the predicted shakeout in the very small business system market is that really small independents will find it difficult to afford field maintenance of this nature.

As a consequence, stores will quickly limit their suppliers to two or three manufacturers and thus shrink the market for smaller companies.

In an expanding market such as small business systems, shakeouts are invariably viewed as opportunities by some entrepreneurs, who use these circumstances to pick up the slack caused by the changing needs of the industry.

In any event, with the shakeout will come consolidation and many new opportunities for the still infant small business systems marketplace.

Ryal Poppa is chairman, president and chief executive officer of Pertec Computer Corp.

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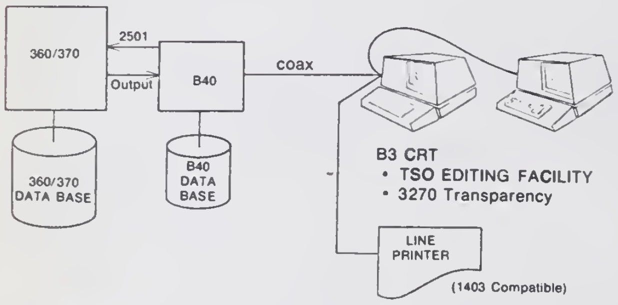

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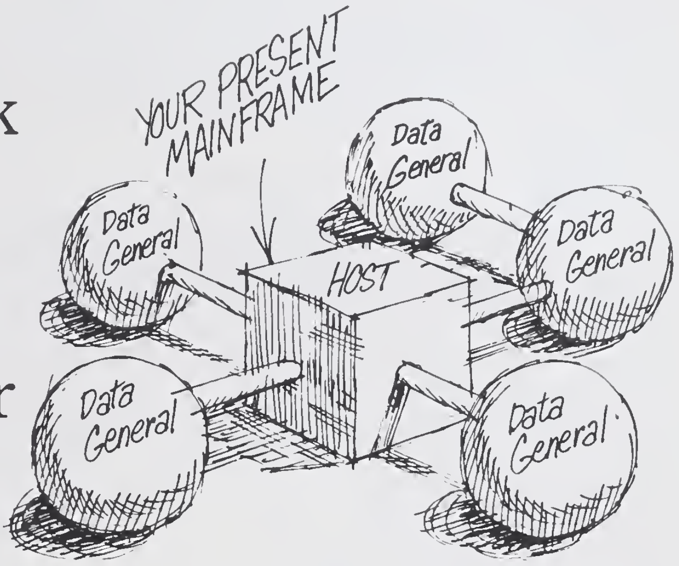

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Company Finds System Eases Growing Pains

(Continued from Page S/18)

for each area of the company to work with the same data. In this way, chance for information getting out of sync was eliminated.

In conjunction with these decisions, Ward realized that a computerized system to load and maintain bills would have to be developed with the ability to assist in maintaining the bills' accuracy.

Hardware Considerations

Hardware was also an important consideration. Ward felt that if it was going to spend a lot of time and money in developing systems for the manufacturing area, it must have the hardware with which to grow.

In its early DP efforts, Ward used an IBM 360/20 that was totally geared to cards. In later stages, the company was reporting information a week to a month late. There was an immediate need to look at future manufacturing systems and to create an environment that would ensure data timeliness. Because of the size of its DP organization and its limited knowledge in programming languages, Ward decided it would upgrade to an IBM System/3.

After the implementation, Ward began to look well into the future relative to growth in the manufacturing area, as well as in the company. It concluded that its DP capabilities would not only have to be expanded in knowledge, but also in people and, eventually, in hardware. Ward felt that, if it was to grow as a company, it would eventually outgrow its System/3. And if the company designed systems to be compatible with this environment, there would eventually be many rewrites. Ward's decision was to enter the 370 arena with an IBM 370/115, for it knew such a system could grow with the company.

The new system not only affected Ward's existing hardware but also affected the manufacturing organization structure. The company made several changes to the manufacturing reporting relationships to improve responsiveness and to directly assign responsibilities. Scheduling was transferred to the production control department from the machine shop.

Stores was to report to the vice-president of manufacturing instead of production control. A production manager was hired to take total responsibility for all efforts geared to fabrication, including industrial engineering, purchasing, production control and the machine shop. These organizational changes divided manufacturing into four areas — fabrication, quality control, stores and assembly. In developing this structure, the company elevated the position of stores to signify its importance, especially in relation to the future MRP system.

During this initial phase, Ward also began evaluating the disciplines in the company, specifically in manufacturing. It was decided that an individual from manufacturing would be assigned to DP to document the environment. This person would still report to the vice-president of manufacturing but would work with DP. The job, specifically, was to prepare a procedures manual depicting all paperwork that currently was processed in the shop.

Ward's approach was to talk to everyone doing the paperwork, including machine shop operators, assembly crewmen and stores personnel. The real environment was not only determined, but many ideas for better ways to perform a given function were also communicated.

Eight months were required to complete the manual. The job, however, was not finished. The next important task was to further communicate what had been accomplished and why the effort was necessary to control paper and forms. Half-hour sessions were scheduled with the operating personnel within the company, especially in the manufacturing area. These sessions were designed to communicate what had been accomplished and how each person would be involved; to make each employee a part of the procedures manual for better support; and to relay why it was essential to follow the procedures, especially in relation to future systems.

The sessions lasted 1-1/2 weeks. Suggestions were still flowing. One of Wards's first keys to success was grass roots involvement.

Ward's next step would have been to implement an inventory system that supported MRP. However, there was a greater need to obtain better control of the shop. It was decided to generate an interim shop floor control system that would give better shop-order priorities.

The system functioned well with the order information it processed, but it could not react to the dynamic environment that really existed, because it was not driven by MRP. However, because of its design, the shop order system fit well into the overall master plan after the implementation of MRP.

After developing a satisfactory inventory control system, Ward was ready to go full speed ahead with the completion of MRP, except for one necessary ingredient — user education. Ward had visited various companies to learn about their systems, and the user was constantly involved in the development of all manufacturing systems. But to ensure total understanding and alleviate lingering doubts of the potential and success of MRP, Ward also sent many of its manufacturing personnel to seminars on the subject.

William Ward Jr. is executive vice-president of Ward Machinery Co.

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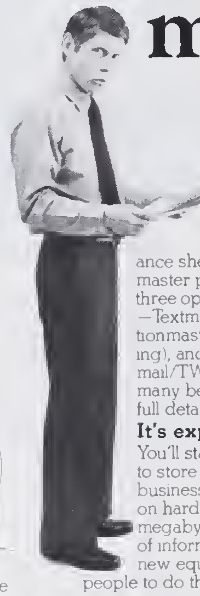

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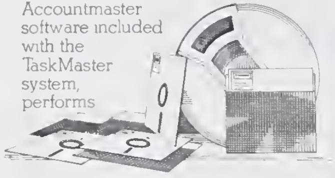

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Minis Produce Plane Maker's Software On-Line

(Continued from Page S/12)

In addition, Grumman has configured two 40M-byte disk systems and two 75 in./sec tape units, and any of those devices can also be switched to either computer.

Large-Team Facility

Grumman now has a development facility for large programming teams either cooperating on a common project or operating independently on other programs.

Primarily intended for interactive program development, MTM is configured to cope with applications in which most jobs are I/O bound. Sharing system resources among multiple users results in overlapping development time and an increase in a programming team's productivity.

Much of Grumman's development activity involves significant amounts of processing, which once started, require no further human interaction until completed. Large compilations or data base test runs are typical examples.

MTM recognizes this fact and permits programmers to "drop off" background batch jobs in favor of asynchronous processing of terminal input. Programmers can then continue operating at the terminal or can sign-off and free their terminals for another use.

On the other hand, it is possible to dynamically interrupt and "pause" a task at its originating terminal. During pauses, any desired command can be issued, including system or task interrogations.

The facility is helpful during dynamic test monitoring. A terminal can also cancel a task it has originated.

Operational Responsibility

Grumman has assigned the responsibility for system operation to the SDF. In general, effective use of any multiterminal system required some degree of central coordination and management. A system operator controls allocation of system resources and monitors ongoing activities. System operation can be handled by a single person or an operational team or it can be shared among the MTM users. The systems operator's activities include:

- System generation.
- Maintenance of the MTM authorized user file.
- Establishment, dissemination and supervision of installation procedures and practices.
- Separation and decollation of spool files output to system line printers.
- Supervision of system peripherals.
- Responding to system console messages from terminal users.
- Backing up system disk files periodically.
- Generating accounting reports.

Maintaining high rates of system availability is important to software development. When the 8/32C was first installed, a variety of causes kept the system from running at its peak efficiency and availability.

To improve this situation, a program of on-site maintenance was created. Later, this program was coupled with incentives for uptime availability.

Through this program, Grumman is able to keep the system operating at least 95% availability, based on a 19-hour-demand day. Although many system OEMs may not agree with that approach, at Grumman it has made the difference in reaching programming milestones on time.

Backup Provisions

Our primary 300M-byte disk unit became 85% full about four months after the SDF became available. Since then, disk occupancy has reached 96%.

Periodic campaigns to delete obsolete files and transfer archival data to tape usually succeed in reducing this figure 70% to 75%. Because a 300M-byte disk that is 85% full requires six reels of tape and takes 12 hours to backup and verify, allowing data to accumulate to the point where that scale of backup operation is necessary is impractical. So we decided to implement an incremental backup system.

Incremental backup transfers to tape only files that have been changed or added since the last full backup. Time required for incremental backup starts at half an hour to an hour (a measure of one day's activity) and rises to four to five hours. At this point, operations initiates a full disk backup.

Sol Danels is program manager for the A6E-WST Project at Grumman Data Systems Corp.

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Expandable System Meets User Growth Need

By Gary R. Copeland
Special to CW

BUFFALO, N.Y. — Technical advances in the minicomputer marketplace, both in hardware and software, have caused many medium-sized companies to create a systems department.

Until recently, a company that was growing was forced to buy a larger machine in anticipation of a growing workload.

Now, most major vendors offer systems that are upgradeable, either within a distributed processing environment or by adding resources to the current system. This phenomenon is desirable because to stay ahead in today's business world, a company must use every resource to its capacity.

Very few companies can afford a $100,000 to $1 million computer whose resources are not being used to the utmost.

Even though it is becoming more and more feasible for a company to create a systems department, the first option a firm should consider in meeting its DP needs is an OEM. If a company stabilizes its growth, there is a good chance software packages are available to meet its needs.

But, if a company is growing, its DP needs will change, and timely and accurate information become even more important. For this type of company, it becomes feasible to create a systems department as Flint Oil & Gas, Inc. did.

Flint was formed in 1971 to explore for oil and gas reserves and to drill, complete and operate oil and gas wells for its own account and for others primarily in western New York and northern and northwestern Pennsylvania. Flint extended its activites to Ohio in January 1977 and, since then, its drilling activities have been conducted primarily in that state.

In the fall of 1977, Flint created a systems department. I was hired to form the department and prove its feasibility to the rest of the company.

Our first project was to obtain a hardware/software configuration that met not only the company's needs as a whole, but also my needs as a programmer/analyst.

Sought User-Oriented System

Our first concern was to find a system that could grow with the company. We also decided that most of our systems would be user oriented.

Therefore, our systems would center around interactive on-line processing by the various departments, with most of the reports being batch processed by the systems department at night. Any system under consideration had to be geared towards meeting these two requirements.

As a programmer/analyst, I thought of many things that would be useful in a system. Coming from a large company, I was used to many of the develpment aids found only with mainframes. I wanted some of these tools for our mini configuration.

The most valuable development tool is a text editor that allows you to work with sections of code, move them around and obtain sections of code from other programs. This type of editor is useful in cutting development time. IBM's SPF editor is an example of the type of editor I had in mind.

Another desired tool was an interactive debugger. I found an interactive debugger useful, especially for those structured programmers who never use "go to" but replace it with a series of switches that are hard to track. It's also useful in making sure your output to files is correct.

Finally, I wanted to use Cobol to develop our systems. I had spent most of my time at the Travelers Insurance Co. working with Cobol and felt I could find more qualified business programmers who were more comfortable with Cobol than Fortran, Basic or RPG.

The Cobol I desired had to support some type of indexed sequential access method (Isam) as well as straight sequential file structures. Development of on-line systems dictated that the Isam used index levels versus one sequential file for the index.

Configuration Choice

Never having worked with minicomputers, I turned to Fred Bonekamp, associate systems director of Timco, one of the Travelers Insurance companies. He and his staff had spent some time considering various minicomputer configurations. They finally chose a Data General Corp. machine.

His decision and his reasons for choosing DG reinforced my research into the company. Flint finally decided upon DG's CS/40, the first member of the hardware vendor's Commercial Systems family.

This system gave Flint what it wanted and also gave me many of the development tools I was accustomed to when working in a mainframe environment. It also had a Cobol enhancement that allowed for format creation and processing from within a Cobol program.

In addition, it allowed for file creation, maintenance and deletion from within a Cobol program. By being able to control all aspects of the business systems I was developing from a Cobol program, development time was shortened substantially.

In the last five months, we have been able to develop, test and put into production three systems. The first to be developed was a disbursement system, which keeps track of the production of each of our wells as well as the revenues obtained by the production. It then disburses these revenues to individuals who have an interest in these wells.

The second system to be developed was an accounting system that not only processes a purchase journal, accounts payable and cash disbursements but also keeps track of how much money is being spent to drill and maintain each well and what aspect of the drilling operation the money financed.

The third system was a standard payroll system.

Each of these systems is user oriented and has cut many of the manual functions.

One of the biggest reasons these systems have been so beneficial is that each department has given me not only its support but has taken the time to sit down and decide exactly what it wants from the system. Most ineffective systems are not caused by bad programming but by users' not knowing what they want and not wishing to take the time to plan what they might need in the future.

This failure is bad not only for the systems department but for the company.

These systems are only the start of what we hope to accomplish. Even though it is just a start, we feel the CS/40 has allowed us to meet our objective of using our computer resources to the utmost.

Gary Copeland is systems director of Flint Oil & Gas, Inc.

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Mini Network Tracks Patients, Aids Treatment

(Continued from Page S/8)

of end of occupancy; and admissions of the old room's availability. When patients arrive at a new location, their names and room numbers are entered to update admissions, billing and dietary files.

Activity Anticipated

While most hospital systems react to admission-discharge-transfer problems after they happen, the Virginia Mason system anticipates patient activity through census records and trend analysis.

A historical data base permits trend analysis governing length of stay and thus permits the hospital to predict room availability four days ahead of time. This capability yields more appropriate personnel scheduling than before and allows the hospital to assign nurses, technicians and specialists by area and shift to meet anticipated requirements.

The four-day predictions also give early warning of potential serious problems. Gardner pointed out that weekends are typically low census periods in hospitals with peak admissions early in the week. "A common assumption in hospitals," he said, "is that Sunday is a high admission day. Our analysis proved that Mondays and Tuesdays are highest at various times in the year. The predictive algorithm in our admissions system accommodates periodic fluctuations that might not be apparent to human intuition."

Radiology Scheduling

For both in-patients and out-patients, use of interlinked terminals has boosted efficiency in the Mason Clinic Radiology Department, which shares services with both the clinic and hospital.

Using a format displayed on CRT terminals, a receptionist enters patient data, assigns available facilities and indicates requested procedures. The latter consist of five-digit numbers that correspond to all standard radiology practices. Initially, receptionists refer to a manual that lists the procedure identification numbers; but, as they gain familiarity with the numbers, they recall them from memory.

When the patient information has been entered, the PDP-11/70 automatically generates a picking slip that identifies the location of all prior radiology films — either in the film room or in the archives. Simultaneously the patient's schedule is printed in a log at the technicians' control area.

As technicians become available, they check the log for the next patient and key in their personal identification numbers. The PDP-11/70 automatically prints a film flash card with patient's name, physician's name, session number, time, date and reason for radiology.

This card is placed in the X-ray film holder to produce a permanent identification on the negatives. When the session is completed, technicians note any additional exposure required by the radiologists on the charge slip, release the patient and enter in a patient release code on the Decwriter III.

Frequent Status Report

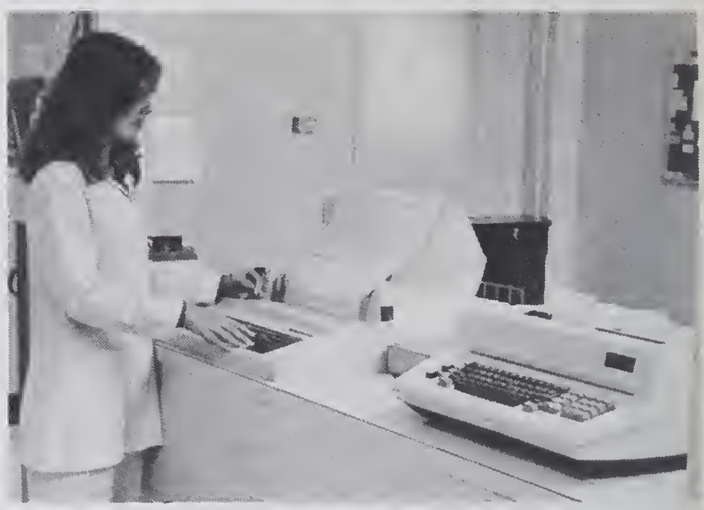
To prevent patients from being inadvertently overlooked, the mini prints a status report every 20 minutes. This report indicates patients who have been scheduled but not taken to an examination room. Usually, technicians recognize the omissions; however, if necessary, supervisors can step in to reorganize patient scheduling.

"After the radiology system was installed," Gardner said, "our audit indicated significant savings. Despite an increase in workload, we were able to reduce film room personnel by two and avoid employing a third for a $22,500 annual savings. In addition, we eliminated $1,600 in printed film locator files. During the audit, we also discovered about $1,000 in procedures for which the patients had not been charged under previous manual methods."

Offsetting costs included a one-time program development charge of $3,300 and recurring annual equipment charges of $12,100. Nevertheless, the system paid for itself in slightly more than eight months and is expected to save nearly $14,000 annually thereafter.

"Although we insist that our new applications demonstrate dollar savings," Gardner explained, "our audits point our efficiency improvements that we classify as intangible. You cannot place a dollar benefit on not keeping a person waiting in a reception area. There is a definite value, to the radiologist and physician, in having a patient's medical jacket and previous films immediately available for review; but these benefits defy easy attribution toward costs or savings."

The programs also provide the support documentation necessary for effective administration. Gardner pointed out that minicomputer analysis of facilities use permits the radiology department to detect trends in patient volume. "For example," he said, "we noted an increase in chest radiology requests and were able to convert a less-used facility into another chest area."



In the radiology area, nurse Kim Constantine reviews a patient schedule that is printed every 20 minutes.

Overnight Charge Posting

The distributed network permits overnight posting of about 12,000 daily hospital/-clinic patient charges. Radiology and clinical-testing posting is accomplished in their own areas, the rest from forms sent to the billing office.

In radiology and clinical testing, charges are based on the original requests that were entered prior to the procedure or test and are revised by changes indicated on printed traveler forms. Throughout the day, clerks call up the original requests on CRT terminals and compare them with the printed forms.

If ther are no changes, the clerks transmit the charge data to the PDP-11/70. If there are discrepancies, the clerks key in the additions or make the necessary deletions in the charge records.

All other patient charges are made from forms supplied by the various hopsital departments to the financial office. Here, four clerks using CRT terminals post changes by patient number and billing department. The data is then transmitted to the PDP-11/70 for spooling on the TU45 tape unit. Each evening, tapes are placed on a Honeywell Information Systems, Inc. Model 2040A for billing.

"The hospital's surgery reporting system is an example of this billing technique and of its associated intangible benefits," Gardner commented. "The system uses a single form to capture billing data for operating-room charges, anesthesia, surgeons, anesthesiologists, surgical assistants, nursing and medical personnel."

For each surgical procedure, the attending nurse enters requested data on the form using current procedural terminology (CPT) codes. Listed are pre- and postoperative diagnosis, procedures, attending personnel, times, delays and sponge report.

Following the operation, the completed slips are forwarded to the financial office for entry in the PDP-11/70. After spooling, the surgeon's and anesthesiologist's charges are automatically calculated and sent to them for review. They either alter the recommended computer-controlled fee because of unusual circumstances or approve the fee as shown. The slips are then returned to the computer center.

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Minis Becoming Like Large-Scale Systems

(Continued from Page S/13)

panies have been hard-pressed (or ill-inclined) to meet the thoroughness of the mainframe vendors. Minicomputer vendors typically test for bug-free operation and measure system performance according to their target specifications, whereas mainframe vendors perform additional, user-oriented testing.

After a computer system is delivered, user concerns become explicit. Applications must be developed and tested; data base files and indexes are created; where necessary, communication is established with host or other related computers.

Depending on the application, an installed supermini should offer the appropriate industry-standard high-level languages and should provide the addressing space needed for large user programs. Most large minis feature multiple high-level langauges — Cobol and RPG-II for business applications, Fortran for scientific jobs and number crunching and conversational Basic.

Unlike batch-oriented mainframes, large minicomputers easily support interactive program development for multiple concurrent users. Working interactively, users can control and handle exception conditions as they occur, rather than waiting hours, or days, for batch results.

Program handling capacity is important because of today's large-user programs, and the amount of available addressing space is a good indication of true supermini performance.

Some large minis feature fast processing speed but offer limited addressing space. A true supermini, using demand-paged and segmented virtual-memory addressing, can open as much address space as a mainframe. It is important that an operating system automatically assign and monitor virtual-addressing activities to allow a user to treat an entire program as if it were entirely main-memory resident.

Large Memory Capacity

Contributing to large addressing space and multiuser interactive operations is large main memory capacity. Today's larger superminis, with addressing capabilities in the millions of bytes, employ error-correction mechanisms to watch over semiconductor memory performance.

Simple parity checking — where one parity check-bit is added to each memory word, then checked when the word is "read" from memory — is not as suited to large-memory operation as the multicheck-bit error-correction codes used by mainframes and the better superminis.

Large minis are increasingly used to maintain data bases for company departments and operating divisions. A DBMS should offer, in addition to a variety of file-indexing schemes, a strong system programming or data manipulation language and file-protection software facilities.

Also, a DBMS should adhere to industry-standard specifications for applications flexibility and reliability of operation.

For data base development, a system programming language should be compatible with standard, high-level programming langauges so that system-programming commands can be freely intermixed within Ansi 1974 Cobol or Fortran IV compilations. This way, applications will use descriptions and structural relations that are already known to the data base program-control processor and thus facilitate data linkage and manipulation where appropriate.

Data Reliability

Reliability of data is critical in an on-line, transaction-oriented DBMS. In addition to standard hardware protection mechanisms, a DBMS should include protection against unauthorized disclosure, alteration or destruction; prevention of actions (under its control) that could lead to invalid alteration or destruction; automatic recovery for actions it cannot control but can detect; and off-line recovery procedures for those it cannot detect.

After a system is installed and applications are running, change begins. New users, new applications and new system or network concepts are brought into play. To remain valuable, a supermini must have the features, flexibility and data-handling capacity to deal with system change and growth.

Here is where an expandable architecture with hardware/software compatibility becomes vitally important and allows new, larger systems to replace existing systems with minimal program-conversion headaches.

Where provided, downward compatibility allows some new programs to be developed on large, fast systems, and then to be transferred to smaller systems for execution. Vendor operating system software should also be as compatible as possible with previous and future vendor releases.

Superminis that run industry-standard, high-level languages and emulate mainframe protocols make it possible to convert some batch-processing applications from mainframe to on-line mini. These conversions are often cost-justifiable compared with the high cost of mainframe expansion, as long as a mini system is large and capable enough to support added activity without degradation.

System change also occurs when mini and mainframe vendors release product improvements in software.

Edward Christiansen is director of software at Prime Computer, Inc.

CUT!

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Recalls One of System's Creators

ARC Design Strategy Stressed Access, Growth

(Continued from Page S/15)

divide processing among independent processors.

Furthermore, it appeared that while two independent processors could almost double the amount of work done, a single processor double in size could do approximately four times as much. Thus the choice was often a bigger machine, even though in those early days upgrading was an unpleasant prospect because it frequently meant rewriting entire applications systems for the different instruction set of the larger machine.

Compatible Machines

Then came compatible computers. In theory, this compatibility made possible an upgrade from one machine to the next in a manufacturer's series without program changes because they all used the same instruction set.

However, by that time, operating systems had grown quite complex and were often incompatible from one machine to the next. Instead of instruction set conversions when upgrading, the business systems user faced operating system conversions.

The same choices confront users of conventional computer design to this day. In any single computer of whatever size, limits to growth and capacity are eventually reached. While it is true that minis keep getting bigger and faster, the maximum capacity one can expect from a single processor may be within sight. What shall be done then?

Another development of the multiprogramming concept was time-sharing — a different kind of attempt to get more use from a single machine. Significantly, time-sharing's inherently interactive nature tended to humanize computers by making them more responsive to users.

Users in turn found many more ways in which to apply the benefits of computing to their needs. Again, the computing load grew and the problem of computer growth limits arose.

And, as an outgrowth of the spread of time-sharing, business began to notice that the time value of information is often significant. Data is more valuable when current than when days or weeks old. On-line business transaction processing and interactive inquiry developed from this discovery.

First Users

Airlines were among the first users to set up on-line, transaction-oriented processing systems attaching many hundreds of terminals, all of which could access and modify common files with immediate response to varied inquiries and up-to-the-second information. They typically used large mainframes for support, generally running very special systems software.

But big machines designed for batch processing and equipped with complicated multiprogramming systems do not lend themselves well to on-line processing. They bog down badly under only moderate transaction loads. They have to be very large indeed to support the necessary number of terminals.

Furthermore, unless there's a duplicate machine for backup, when a mainframe goes down, all DP tasks throughout the company — and every terminal in the place — goes with it.

Is there a solution to this dilemma? Or must we go on forever building conventional computers bigger and bigger? Can they in fact grow bigger indefinitely?

An even more important question is: Does building ever-larger conventional computer systems really serve the needs of the transaction-centered world of business?

New Architecture Needed

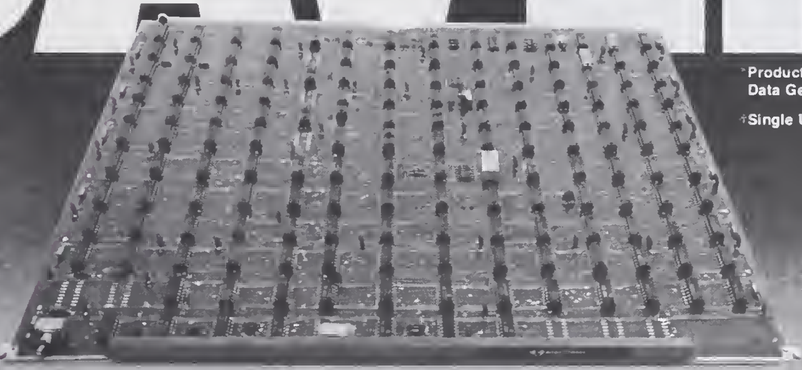
Datapoint's conclusion was that conventional computer architecture cannot cope indefinitely with transaction growth. The business computing solution to the dilemna is not just an infinitely large, infinitely fast machine.

One way to expand processing throughput indefinitely is with an indefinitely large number of processors. Using a number of relatively independent processors provides an answer to the problem of downtime, too. This idea, as such, has been attempted. But its success depends upon the method used.

Datapoint's method of attaching computing resources to common data bases relies upon two techniqes: First, a software-controlled specialization of processors into two functional types — one to execute applications and another to manage data base information And second, a combined hardware/software interprocessor bus to interchange information between the two types of processors without imposing an overhead penalty on them.

These techniques work together; neither could do the job alone. Functional specialization of processors achieves little if interchange of data must take place at slow speeds. High-speed interconnection of processors avails nothing if large portions of each processor must be devoted to managing communications. But when these strategies are coordinated, the result is nearly unlimited throughput and growth.

Victor Poor is vice-president for research and development at Datapoint Corp.



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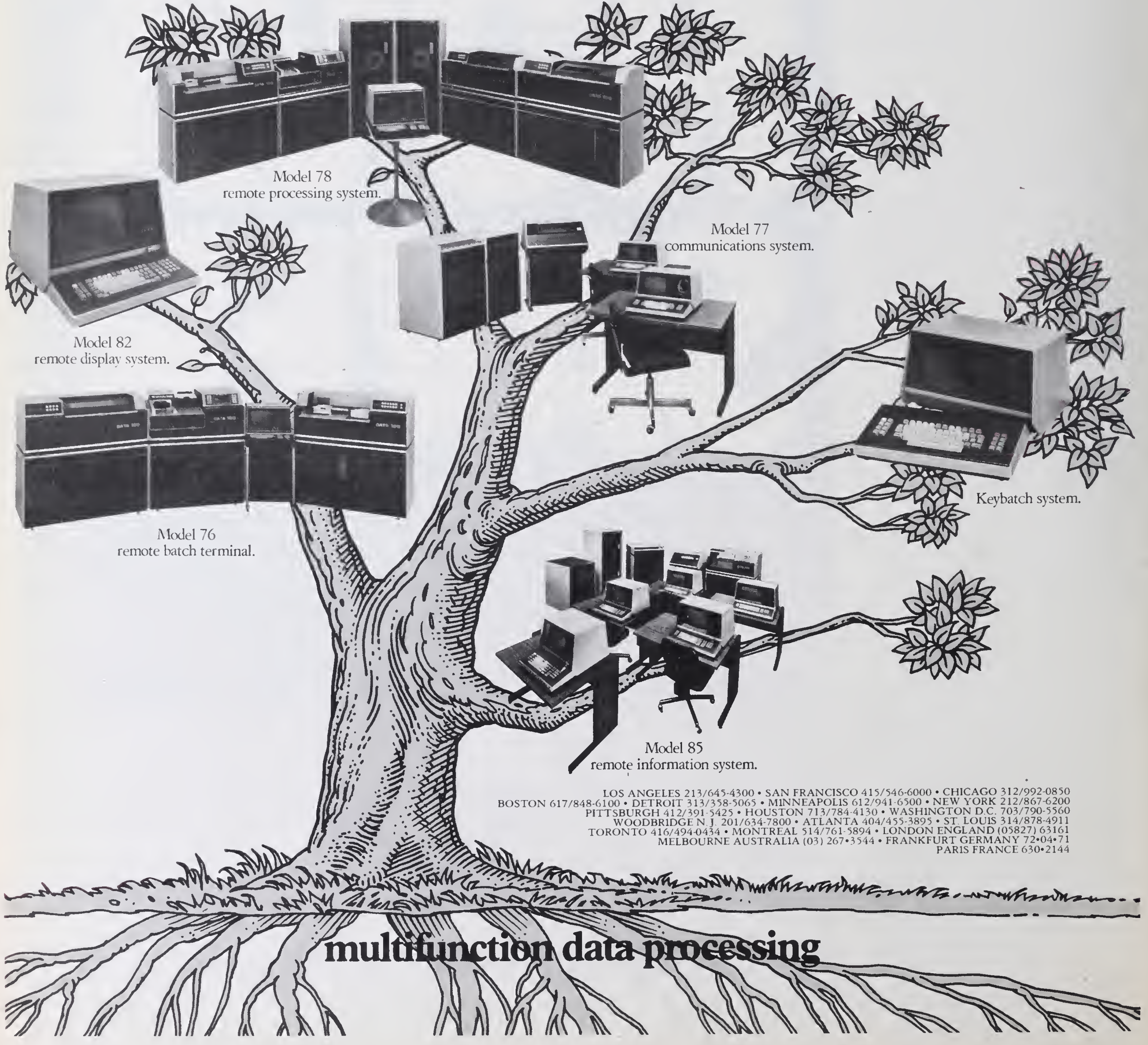
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For Series/1 Peripherals

Non-IBM Vendors Offer Cost Savings

By Jeffry Beeler
CW Staff

SAN JOSE, Calif. — Series/1 users can reap "substantial" cost savings if they order their peripherals from the right independent vendor rather than from IBM, SBS Publishing, Inc. concluded following a recent review of nearly 40 non-IBM suppliers of Series/1 products.

Many independent vendors supply Series/1 peripherals that rival or outperform their IBM counterparts for a considerably lower price, the publishing firm reported in its study *Non-IBM Suppliers of Series/1 Products.*

CRT terminals account for more non-IBM product installations than any other class of Series/1 peripherals, with printers ranking as the second most likely Series/1 module to be ordered from independent sources.

Until recently, Series/1 users also had to look to alternative suppliers for all their removable and high-capacity disk systems. Last June, however, IBM reacted to this weakness in its product line with the introduction of the Model 4963, the company's first high-capacity mass storage unit for the Series/1, SBS Publishing reported.

Citing a recent survey of 18 Series/1 users, the publishing company noted that eight of the firms had attached independently supplied CRT terminals to their minicomputers. Furthermore, follow-up studies suggest this ratio of IBM to non-IBM terminal installations is representative of Series/1 users in general, the study said.

Most Popular Replacement

Lear Siegler, Inc.'s ADM-3A tops the list of the most popular IBM terminal replacements, with Hazeltine Corp.'s Model 1500 occupying a distant second place, SBS Publishing found.

Price, more than any other factor, drives users to pick an independent's CRT over the IBM original, the author of the study concluded. Although the IBM 4979 "dumb" terminal offers basically the same capabilities as some of its strongest competitors, it costs more than twice as much as comparable Lear Siegler and Hazeltine models.

A 4979, for example, costs $1,735, compared with $895 for an ADM-3A and $850 for a Model 1400.

Price also prompts the replacement of many Series/1 printers, the study continued. Users who specify a 120 line/min printer, for example, will pay $9,565 for an IBM Series/1 unit, compared with $7,550 for a similar Data 100 Corp. unit.

Likewise, a 300 line/min printer costs $13,365 from IBM, while rival models from Data 100 and Digital Associates Corp. sell for $8,600 and $10,965, respectively.

In addition, users of the IBM 4973 and 4974 printers must buy the equipment, whereas many other vendors of comparable printers make their products available through leases.

But the popularity of non-IBM Series/1 printers stems not just from their economic advantages but also from their performance benefits, SBS Publishing concluded. Series/1-compatible printers from independent vendors offer assorted operating

(Continued on Page 52)

Increased Small Systems Options Complicate Hardware Evaluation

By Raymond R. Kramer
Special to CW

DALLAS — Interest in minicomputers is high today, both among smaller businesses and larger firms. Yet precisely because small business computers are handling such a proliferation of jobs, questions persist as to their usefulness for particular businesses. Just what can you expect when you consider the purchase of a minicomputer?

Here are some general guidelines that should be of interest to prospective minicomputer users.

First, consider cost. There is no fixed cost to a small computer. What you pay depends on the system you select. Usually, however, the cost is no higher than that entailed by adding a single clerical employee to your staff.

Investment credit and initial depreciation bonus further reduce this cost. Many users choose a full-payout lease, but the real cost should be much less.

Next comes the matter of specialized personnel. Do you need a computer programmer? Normally, no. Anyone who can type should be able to operate a typical small business computer.

Pre-programmed software tailored to the user's requirements eliminates the need for programmers, and most office people who operate the small computers are fully trained and proficient within two weeks.

Will your small computer ever malfunction? At some time, probably. There is no way a manufacturer can ensure continual flawless performance. Sometimes a component will simply expire, for no good reason.

That's why it's important to look at the computer you are contemplating in terms of modularity and maintainability. It's one thing to substitute a printed circuit module — and something else to overhaul a complete system.

Flexibility Important

A minicomputer should prove flexible enough to justify your investment. Small computers have become practically all things to all people. For hardware wholesale distributors, for example, they maintain inventory, minimize back orders and help build sales.

Motel chains use them for reservations, analysis, direct-mail promotion plus routine accounting. At electrical supply houses, minis speed customer service and get bills out at the end of the month — with few personnel.

Textile firms use the machines to handle work orders, invoicing, cash receipts, inventory, account aging, salesmen's commissions and management reporting.

(Continued on Page 56)

Two Packaged Systems Join DG's Micro Line

By Jeffry Beeler
CW Staff

WESTBORO, Mass. — Two families of packaged Micronova systems, each of which support a choice of four printers or CRT terminals, range in price from less than $10,000 to about $16,000, according to a spokesman for Data General Corp., the systems' manufacturer.

The DG source cited this price range and "configuration flexibility" as two of the systems' chief user benefits.

Said to belong in the same performance class as the Digital Equipment Corp. LSI-11, the two DG systems families include the 9045, a dual diskette-based series with a total mass storage of 630K bytes; and the 9070, which incorporates a cartridge disk unit with 5M bytes of fixed and 5M bytes of removable storage.

Although both series incorporate a Micronova processor, the 9045's CPU expands from 2K to 16K words, while the 9070's stores 2K to 32K words, the spokesman explained.

Each family's software support facilities include console debug, automatic program load and DG's Disk Operating System (DOS), which reportedly supports multitasking programs and aids compilation, linking, testing and debugging during software development. Utilities available with the packaged systems include command line interpreter, text editor, macroassembler, library file editor, relocatable loader and symbolic debugger.

Software Options

Software options, meanwhile, are said to support single- and multiuser Basic, Fortran IV and Business Basic, which provides file management capabilities like indexed sequential access method (Isam). In addition, the two systems families offer optional sensor I/O and communications software including DG's sensor access manager (SAM) and communications access manager (CAM).

SAM supports analog-to-digital, digital-to-analog and digital I/O interfaces, while CAM supports asynchronous, synchronous and bisynchronous protocols, DG sources said.

The packaged systems' software also reportedly permits RJE 80 (2780/3780) and Hasp II communications for applications in which the 9045 and 9070 series

(Continued on Page 52)

Matrix Printer Computes Fastest Printing Routes

IRVINE, Calif. — Faster throughput is reportedly available with a Microdata Corp. printer built around a microprocessor that automatically computes the fastest route to the next printed line.

Though typically an output printer, the 165 char./sec Matrix also serves as an input terminal when equipped with an optional keyboard, according to Microdata sources. As an input terminal, the printer provides functions like horizontal tabs and vertical form formatting that users can program either from the optional keyboard or a host processor.

Matrix reportedly replaces Microdata's former 120 char./sec printer, which users could upgrade to a 165 char./sec unit as an option.

Standard features with the company's latest printer reportedly include paper-out sensor, internal diagnostic set, 96-char. Ascii set and a choice of RS-232C or byte-parallel interface.

The printer outputs a 9 by 7 dot matrix bidirectionally across a 132-column line and highlights data with a selectable, expanded type face, Microdata said.

Available in beige and brown "earth tones" for office and factory use, the printer costs $1,900 with options an additional $170. Microdata is located at 17481 Red Hill Ave., Irvine, Calif. 92714.

Two Packaged Micronovas Support Various I/O Units

(Continued from Page 51)

are linked to a remote host.

Business Basic and Isam allow the two systems families to serve as small data systems, while the SAM, CAM and sensor I/O software packages suit the configurations to industrial control and laboratory applications, the spokesman said. The CAM and RJE80 software, meanwhile, allows the systems to function as education data entry/collection terminals, he added.

Through this asynchronous interface, users can attach a choice of DG printers and CRT terminals, including the 30 char./sec Model 6042 printer, the 60 char./sec Model 6040 printer, 64-char. Model 6052 CRT terminal and 96-char. Model 6053 display.

A Model 9045 system incorporating a 16K-word Micronova, 630K-byte dual diskette unit and asynchronous interface costs $9,495 with a 30 char./sec printer; $9,745 with a 60 char./sec printer; $9,085 with a 64-char. CRT terminal; and $9,385 with a 96-char. display terminal.

A Model 9070 incorporating a 32K-word Micronova, 10M-byte cartridge disk subsystem and asynchronous interface costs $15,595 with a 30 char./sec printer; $15,845 with a 60 char./sec printer; $15,185 with a 64-char. display terminal; and $15,485 with a 96-char. dispay terminal.

Each model offers an optional half-bay or 3/4-bay cabinet for an extra $725 or $1,150, respectively.

All the 9045 and 9070 models are available now from Data General at Route 9, Westboro, Mass. 01581.

Laboratory Mini Speeds Assays

NEW YORK — A minicomputer-based system for assay data reduction produces test results "in a fraction of the time required for manual analysis, according to the product's developer, Olivetti Corp. of America.

Intended for clinical and investigative laboratories, the Olivetti P6060-based system reportedly speeds most radioimmunoassay (RIA) and competitive protein binding assays. The desktop system processes an assay consisting of a 24-tube standard curve and 200 unknowns in less than 15 minutes.

Users can enter data into the system manually through an integrated keyboard or automatically through an optional paper tape reader. When working with paper input, users can select either a continuous or an interactive operating mode.

In the continuous operating mode, the system processes standards and unknowns automatically. In the interactive operating mode, this function is performed manually.

Olivetti officials recommend the continuous mode for rapid processing of well-defined assays and the interactive mode for new or less stable procedures.

Depending on the options a user specifies, a 32K-byte 6060 system with RIA programs plus a built-in printer and dual floppy disk unit costs $11,150 to $14,000. Olivetti is located at 500 Park Ave., New York 10022.

Non-IBM Firms Offer Bargains

(Continued from Page 51)

speeds, especially in the line printer area, where outputs range from 60 line/min to 1,000 line/min.

IBM's offerings, by contrast, provide just three operating speeds — 120 char./sec, 120 line/min and 300 line/-min.

To increase the variety of output rates for its users, IBM will almost certainly extend its Series/1 printer line during the next three years, the study predicted. Expected additions to the family will probably include low-speed teletypewriter and ink-jet units as well as at least two line printer models operating at less than 1,000 line/min, the report added.

In contrast to its CRT terminals and printers, IBM's Series/1 disk units hold a large competitive edge over mass storage units from independent vendors. In end-user quantities, a 64M-byte version of the 4963 disk system costs $12,230 — a price/-performance few Series/1 disk system suppliers can match, the publishing company said.

Non-IBM Suppliers of Series/1 Products, which consists of more than 250 pages including illustrations, costs $350 and is available from Suite 190, 4320 Stevens Creek Blvd., San Jose, Calif. 95129.

Shugart Establishes Eastern Repair Site

WALTHAM, Mass. — East coast customers of Shugart Associates' floppy disk systems can now have their products serviced regionally, following the company's formation of its first eastern U.S. repair depot here.

Housed in the Sunnyvale, Calif., firm's eastern regional sales office, the depot will repair and refurbish any product in Shugart's disk systems line.

A factory depot at the firm's Sunnyvale manufacturing facility will continue to service disk systems for Shugart's users in the western and midwestern U.S.

Customers can contact the east coast repair depot at 1345R Main St., Waltham, Mass. 02154.

NOTICE

ACS BRIEFING FOR MANAGEMENT CONSULTANTS

AT&T will conduct a briefing on Advanced Communications Service (ACS) specifically for management consultants specializing in data communications systems.

The purpose of this briefing is to:

- Respond to the inquiries we have received from various consultants;
- Provide data communications consultants with a better understanding of the service;
- Solicit feedback and suggestions regarding satisfying data communications user needs with ACS.

This briefing will be conducted Thursday morning, August 31, 1978, at a Bell System facility in northern New Jersey. This briefing is intended for management consultants specializing in data communications systems. It is not a briefing for users of data communications equipment or software.

Attendance will be limited to two representatives per consulting firm. For reservations and information, please call (800) 526-0642. In New Jersey, call (201) 540-6592.

Bell System

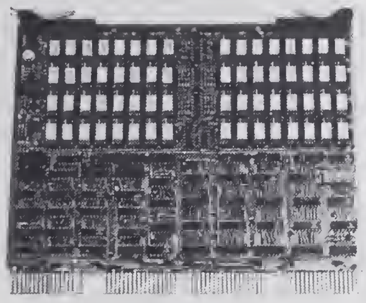
Disk System Emulator Replaces LSI-11 Head-Per-Track Units

HARTFORD, Wis. — Users of the Digital Equipment Corp. LSI-11 can reportedly replace their head-per-track disk units with a General Robotics Corp. swapping disk emulator that stores 512K bytes and accesses in less than 100 microsec.

Using a charge coupled device memory array, the single-board SDV11 sorts files "in a fraction of the time" required for conventional disk systems, a spokesman said.

Under DEC's RT-11 operating system, the "Superdisk" emulator makes available 1,024 logical blocks with "several hundred" times faster access than that of rotating disks.

The SDV11, which fits on one Q-bus-compatible, quad-printed circuit board, costs $7,500 from 57 N. Main St., Hartford, Wis. 53027.


General Robotics Corp.'s SDV11

Nova Disk Unit Controllers Offer Implied Seek Feature

ANAHEIM, Calif. — Only one command is reportedly necessary to make a family of universal disk controllers from Western Peripherals, Inc. seek a track address and then read or write the desired information.

With their switch-selectable "implied seek" capability, the DC220A controllers automatically consult a prerecorded index of track addresses and then seek the appropriate location when commanded to read or write, according to a Western Peripherals spokesman.

In addition to combining seek and read/write commands in one command, the units are said to cost 30% less than their manufacturer's previous controller model.

Western Peripherals, Inc. DC220A

Intended to operate with the Data General Corp. Nova line, the DC220A series consists of two models. The first accommodates four 10M-byte disk units or two 20M-byte, four-platter systems for a total capacity of 40M bytes, the source said. The other model supports four 2.5M-byte or two 5M-byte disk systems or one 10M-byte unit for a total capacity of 10M bytes, the spokesman added.

Both models reportedly provide platter-select switching and are media- and software-compatible with the DG 4234 and 4046 disk systems. The controllers need no modifications to operate with the DG Rdos and the Educational Data Systems, Inc. Iris software systems.

Occupying one CPU card slot, the single-board controllers accommodate multisurface, single-platter disk systems as well as cartridge-type, single-platter or multiplatter units.

Both the 10M-byte and 40M-byte models cost $1,750 and are available from the Western Peripheral Division of Wespercorp at 1100 Claudina Place, Anaheim, Calif. 92805.

Tape Unit Controller Suits LSI-11 Systems

GARDEN GROVE, Calif. — Up to eight 7- or 9-track tape units can reportedly be coupled to the Digital Equipment Corp. LSI-11 with a tape system controller from Distributed Logic Corp.

Packaged on one quad module that occupies two device locations in an LSI-11 backplane, Dilog 1 operates at 12.5- to 75 in./sec and provides switch-selectable byte order for DEC or IBM hardware compatibility, according to a Distributed Logic spokesman.

Compatible with DEC's TM11 tape systems, the controller is said to support units whose magnetic media is compatible with 7- and 9-track IBM and Ansi standards for NRZI recording on .5-in. tape.

Distributed Logic supplies the controller either singly or as part of a tape subsystem with cables and one or more tape drive units.

Dilog 1 costs $2,295 and is available from 12800G Garden Grove Blvd., Garden Grove, Calif. 92643.

Distributed Logic Corp.'s Dilog 1

NOTICE

ACS BRIEFING FOR SUPPLIERS

AT&T will conduct a briefing on Advanced Communications Service (ACS) specifically for suppliers of equipment and software that are used for data communications.

The purpose of this briefing is to:

- Present functional specifications on the terminal and host computer protocols that ACS supports;
- Exchange views regarding protocol support required in ACS to interface with additional terminals and computers.

This briefing will be conducted at a Bell System facility in accordance with the following schedule:

Date	Location
Monday p.m., Sept. 18, 1978	Northern New Jersey
Wednesday p.m., Sept. 20, 1978	Chicago, Illinois
Thursday p.m., Sept. 21, 1978	Los Angeles, California

This briefing is intended for companies that produce equipment or software and may require connection to ACS. It is not a briefing for users of such equipment or software.

Attendance will be limited to two representatives per company. For reservations and information, please call (800) 526-0642. In New Jersey, call (201) 540-6592.

Bell System

In-House Mini Boosts Insurance Firm's Service

LYNN, Mass. — Improved customer service tops the list of benefits an insurance company has experienced since it switched from a service bureau to an in-house minicomputer system.

With all its policyholder data on-line for the first time, Admiral Insurance Agency, Inc. can now post receipts daily and check the status of any customer account within a few seconds, according to company president Sam Tassle.

As a result, Admiral's clerks no longer have to search at length through their paper files to answer a customer inquiry. Instead, they retrieve the requested information from the firm's computerized data base while the caller waits on the phone.

Tassle also credits the minicomputer system with saving Admiral "thousands" of dollars by improving the company's cash flow.

Before it acquired the current system, Admiral relied on an NCR Corp. bookkeeping machine and then, for five years, on a service bureau.

Neither of these previous systems, however, allowed the firm to access its customer data in real time, Tassle explained. In addition, both the bookkeeping machine and the service bureau produced numerous errors, proved unduly expensive and involved extensive manual filing.

"I knew we needed an inhouse computer," Tassle recalled. "It was simply a case of determining what was the right system."

Seminar Proved Helpful

After a four-year search for an appropriate system, Tassle's efforts finally bore fruit at an insurance industry management seminar in Coral Gables, Fla., where he heard a speaker praise the virtues of a Wang Laboratories, Inc. computer. Impressed with what he heard, the company president investigated the speaker's claims and two months later bought a Wang WCS-30 system with a 10M-byte disk unit, two CRT terminals, two printers and an insurance industry software package written by the Pittsburgh-based Redshaw, Inc. agency.

In addition to maintaining all of Admiral's policy information and its client data base, the Redshaw software helps generate policies and adjust premiums automatically as well as modify and renew policies, Tassle said. The software also helps generate invoices, receipts, profit/loss statements, balance sheets, aging statements and almost 300 types of customized reports.

Other functions performed by the Redshaw programs include general ledger, accounts payable and accounts receivable.

"The main thing about this system is that it provides me with information I never had before," Tassle said. Moreover, the system allows Admiral to instantly retrieve and update that information.

"If a client calls, I not only can give an immediate response to a question, but I can then also say, 'Yes, you do have a particular policy and, incidentally, you have an outstanding balance of $80,' " the company president noted.

Another benefit the agency has derived from its minicomputer system is quicker refunds from its affiliated insurance underwriters, Tassle added. When customers cancel their policies, the insurance companies sometimes wait as long as several weeks before sending Admiral a return premium.

"If I've got to wait two to six weeks before receiving a credit, that's money out of my pocket," Tassle said.

With its current system, by contrast, Admiral automatically calculates and prints pro-rata cancellation, short-rate cancellations and flat-rate data and then attaches this output to a policy. As a result, "we can take credits immediately," the company head explained.

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Each machine was designed to give you a number of high-performance features. And both can support a variety of interfaces, including RS232 and CCITT.V24, to fit into systems made by HP and other manufacturers.

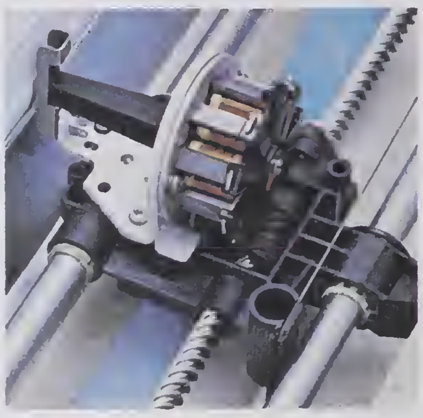
Bi-directional printing increases throughput. Both printers zip along at 180 cps in both directions, depending on your line layout. The microprocessor chooses the quickest path, and increases the speed even more by suppressing leading and trailing blanks.

High-speed slew for columnar data. When the microprocessor senses more than ten blanks in a row, it slews the print head at 45 inches per second to the next print position.

Three ways to print. The Character Compress/Expand Modes let you print more data on a page and emphasize points with headlines and titles. You can get as many as 132 characters on an 8-inch line, or 227 on a 14-inch line.

High-quality print, with six copy resolution. A 7 x 9 dot matrix (versus the usual 7 x 7) gives you clear, crisp printouts, right down to the sixth copy and meets the 128-character USASCII standard. And the extra two dot rows allow true underlining and descenders without character blurring.

Programmably interchangeable character sets. The HP 2631 can be made to print alternate character sets without reconfiguring the printer.



Long lasting, quick change print head saves service calls. The 9 wire print head is conservatively rated at a 100 million character life-span. It's also self-aligning. When you finally replace the head, you can do it yourself in a couple of minutes.

Long-life cartridge ribbon for a clean change. With a life span of at least 10 million characters, this innovative drop-in cartridge takes the mess and trouble out of ribbon changes.

Self-test for quick status checks. One key tells you if the printer is ready to go. If it isn't, the self-test feature helps you isolate the problem, reducing the time and cost for repairs.

Run everything under program control. All the features described and more can be programmably controlled. The software can take you in and out of the various modes. Or you can make a change yourself using one of the front panel switches or keys.

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For First-Time Users

Turnkey System Does Accounting, DDP Jobs

CAMPBELL, Calif. — Accounting, distributed processing and word processing capabilities are all combined in a turnkey small business system aimed at first-time users, according to a spokesman for Data Terminals and Communications, Inc. (DTC), the system's developer.

The Taskmaster system typically incorporates a 64K-byte DTC Microfile minicomputer, 315K-byte dual diskette unit, four-page DTC-382 CRT terminal and 45 char./sec daisy wheel printer — all packaged in a desk-like enclosure.

Together, these hardware modules form DTC's first integrated small business system, the source explained. Previously, the company had marketed its processors and printers only as separate units without software or encompassing work stations.

Main Storage

The system's 64K-byte main storage consists of an 8K-byte read-only memory plus a 56K-byte random-access memory, and the accompanying printer is said to provide an 86-char. steel print wheel.

Additional space in the system's work cabinet permits users to install a second 315K-byte dual diskette unit, the spokesman said.

Hardware options include a 10M-byte hard disk unit expandable to 150M bytes, and a 200 char./sec matrix printer. The 10M-byte disk system provides 5M bytes of fixed storage and 5M bytes of removable storage.

A DTC spokesman likened the Taskmaster in performance to the IBM 5110, Wang Laboratories, Inc. 2200 system and Cado Systems Corp. System 20. None of these competing systems, however, offers as standard equipment an 86-char. steel print wheel or a four-page video display terminal, the source noted.

Applications software available with the system includes Accountmaster, Stationmaster (for distributed processing), Textmaster (for word processing) and Mailmaster (for electronic mail). Accountmaster, a general business package, performs most standard accounting functions, the spokesman explained.

With these software packages, the system reportedly suits applications in assorted fields, including business, industry, science and education.

A typical Taskmaster configuration costs $16,990 and is available at 590 Division St., Campbell, Calif. 95008.

Unit Lets Users Replace Printer

SAN DIEGO — Using an adapter from Datasystems Corp., customers can reportedly replace the Burroughs Corp. A-9249-2 line printer with any unit compatible with the Centronics Data Computer Corp. line.

In this way, the Burroughs Line Printer Adapter (BPLA) Helps users cut their printing costs, according to Datasystems spokesmen.

For example, by allowing the Printronix P-300 or P-150 printers to operate in place of their Burroughs counterpart, the BLPA gives users both printing and plotting capabilities for the price of a print-only unit, the sources said.

Software transparent with its Burroughs host processor, the buffered adapter is said to permit parallel data transfers at up to 125K bytes/sec between a printer and the Burroughs B80, B700, B800, B1700 and B1800 CPUs.

The unit costs $400 with OEM discounts available from Datasystems at 2333 Camino del Rio South, Suite 310, San Diego 92108.

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The schedule for the 1978/79 Series is:

Sept 6, 1978	Newton MA
Oct 3, 1978	Valley Forge, PA
Oct 5, 1978	Washington D C
Nov 9, 1978	Palo Alto CA
Jan 16, 1979	Orange County CA
Feb 8, 1979	Ft Lauderdale FL
Feb 26, 1979	Atlanta GA
Mar 29, 1979	Dallas TX
April 17, 1979	Dayton OH
April 19, 1979	Chicago Il
May 8, 1979	Denver CO

Invitational Computer Conferences

Invitations are available from participating companies or the ICC sponsor For further information contact. B.J Johnson & Associates, 2503 Eastbluff Drive, #203, Newport Beach, CA 92660. (714) 644-6037.

Vendor Executive Advises Users in Systems Selection

(Continued from Page 51)

In short, a small computer is a tool that is adaptable to many purposes.

When you ask yourself where you should start when considering a small computer, the natural answer is: with a problem. Until you define your problem, you cannot expect to discover the hardware and software that will provide a solution.

First, define what it is you would like to achieve in your important operational areas like inventory control, sales or accounting. Then discuss your requirements with a small computer specialist or manufacturer.

The problem-solution approach will prove your safest guide in deciding whether a small computer is for you.

'A Better Way'

You should not need to change your way of business life when installing a mini. Accommodating the computer is not the name of the game.

Indeed, many vendors encourage customers to train existing personnel who know your "way of business life" to operate the small computer, because a minicomputer can provide you with a more efficient way of running your business. It is not so much a different way as a better way.

Who should be consulted during the introduction of a minicomputer? In smaller firms, preferably the entire office work force.

Don't look at equipment as a hardware-software combination but as a possible solution to your requirements. Thus when selecting a small business system, the hard work is not done when considering your purchasing options but working with your own people to define your business needs.

Inevitably in such a defining process, it is necessary to discriminate real needs from the never-never world of optimal solutions. What is feasible within the bounds of available technology? How will a proposed change benefit not only one department but several?

Next, examine equipment from several manufacturers. Ask the vendors to refer you to some of the applications for their equipment. Measure the relevance of their applications to your own. Is there an analogy?

Look for hidden costs. For example, can your existing personnel manage the new computerized system, or will you need to hire specialized outside help? Will the new system demand drastic revisions in your other systems to generate input, or will you benefit from a small computer within the parameters of your existing organization?

Beware of computerized systems that only specialists can operate. Particularly in a small- or medium-sized company, it is vital that the operations of the system be comprehensible both to operators and management, that a department manager, for example, be able to operate it and enter and retrieve information at will. Otherwide, you will be at the mercy of the system.

Make sure you accurately gauge your systems needs. Getting capability you don't need can prove expensive.

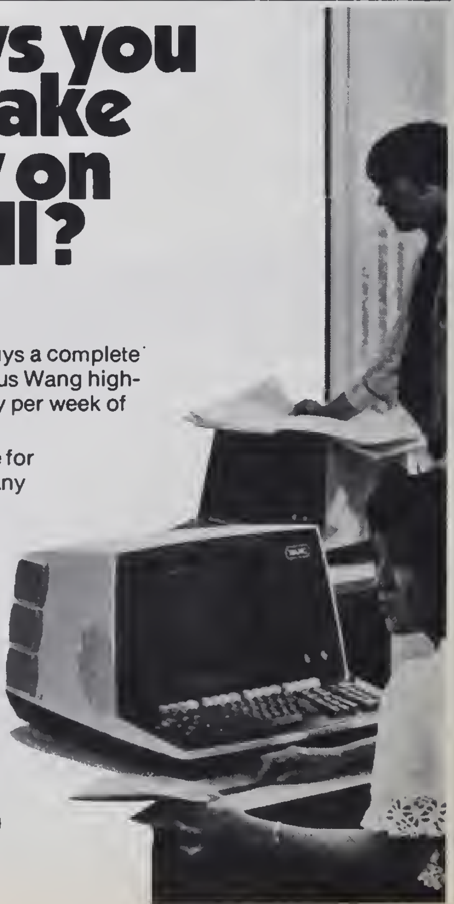
Make sure also the system is expandable. Will it accommodate your growth needs, or will it meet your needs for today only?

Bring all relevant people into the selection process. It is critical that all departments involved know at the outset how their job functions will be affected by computerizing.

When introducing the computer that you have purchased, make a presentation to all office employees so that they know what it does and why the company installed it.

Raymond Kramer is president of Century Computer, Inc., a Dallas-based manufacturer of small business systems.

Who says you can't make money on payroll?



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If payroll service competition is your problem, get the complete story on Wang bundled computer systems from Joe Nestor (617) 851-4111,
Wang Laboratories, Inc.,
Lowell, Massachusetts 01851.

WANG

Micro Chips

Thinker Offering 16K RAM Board

BERKELEY, Calif. — George Morrow, designer of the Econoram 4K static memory, has introduced a 16K static memory board called Superam 16 for S-100 microcomputer systems.

Retailing for $299, the Superam 16 is designed to save from $50 to $100, compared with prevailing prices in 16K kits.

Superam 16 is a complete kit featuring four independently addressable and write-protectable 4K blocks. The design reportedly uses just 11 circuits to keep the board uncrowded and trouble-free.

The board was designed to meet the proposed IEEE standard for S-100, ensuring full compatibility with all S-100 systems. All signals are said to be fully buffered, including address and data lines.

Superam is available at computer retail outlets throughout the US, or it may be ordered directly from Thinker Toys.

Thinker also announced that the price of its Discus I full-size floppy disk memory for S-100/8080 microprocessor systems has been raised from $895, the introductory price, to $995.

For additional information, contact Thinker at 1201 10th St., Berkeley, Calif. 94710.

Imsai Adds RAM Line

SAN LEANDRO, Calif. — Imsai Manufacturing Corp. has introduced RAM III, a line of dynamic random-access memory boards available in 32K- or 64K-byte versions.

Specifically designed for inclusion in Imsai's line of desktop CRT systems, the boards are also available as add-ons to existing systems. RAM III boards are S-100-bus-compatible and do not obsolete already existing Imsai RAM boards, the firm said.

Refresh occurs during all stages of computer operation with RAM III and is synchronized so refresh takes place when the CPU is not using memory, according to the firm.

The 32K version costs $895 and the 64K version $1,695 retail or from Imsai Manufacturing Corp., 14860 Wicks Blvd., San Leandro, Calif. 94577.

Home Unit Suits Novices

CHICAGO — Interact Electronics, Inc. has introduced its Model One, a home computer system with applications for entertainment, education and household management.

The Model One comes with a keyboard and built-in cassette tape deck and includes 8K of random-access memory and 2K of read-only memory.

The Model One costs $449.95 from Interact Electronics, Inc., P.O. Box 8140, Ann Arbor, Mich. 48107.

Using 'Universal' System

Firm Cures Development Ills

NEWPORT BEACH, Calif. — There are two recurring nightmares in the life of the software engineering manager of any small to medium-sized firm using microprocessors. One is suffering through downtime on the firm's microcomputer development system. The other is facing the decision between making do with the current microprocessor hardware, perhaps risking an inadequate solution or scrapping the current microprocessor and making huge new investments in hardware, software and development aids.

One solution to this dilemma at Flight Systems, Inc. is the 8002 microprocessor development system from Tektronix, Inc., which can support several different manufacturers' microprocessors.

The $22,000 8002 is a full development system, including facilities for program development and assembly along with in-circuit emulation for debugging.

The Flight Systems 8002 consists of:

- The basic system box, which holds the processor cards, random-access memory, interface boards and a programmable read-only memory (Prom) programmer.
- A Tektronix CT-8100 CRT terminal for interactive programming.
- A dual floppy disk drive storing about 300K bytes of information on each disk.

The key to the universality and flexibility of the 8002 is the use of a triad of CPUs internally: the system processor, the emulator processor and the assembly processor. The first controls the disk operating system and performs such jobs as file management and system input/output. The second personalizes the development system to the target microprocessor, executing the program in the prototype system and controlling the prototype input/-output.

The third is given only one job: performing program assembly in a table look-up mode.

This multiple architecture enables the development system to support new microprocessors with the addition of a processor card containing the new emulator CPU.

Most Important Feature

According to Don Pierson, Flight Systems' manager of microcomputer development, the universality of the 8002 is perhaps its most important feature. As a $12 million-a-year engineering and manufacturing firm, Flight Systems uses several types of microprocessors, both in its own systems and in those it develops for its customers.

"Often a customer comes to us with the microprocessors all picked out," Pierson said. "We use the 8002 to adapt our system to the customer's particular needs easily and quickly."

The other advantage to this universality, he added, is that it has freed the company's system designers to select the best microprocessor for a particular job without having the decision biased by an existing big investment in a development system that handles only one device. "A universal development system makes it easy to change from one microprocessor to another," Pierson said, "and work with as many as half a dozen different microprocessors from as many manufacturers."

This university also carries within it the seeds of a serious problem during system downtime. "If you've got a universal system like the 8002, you make use of it," he said. "But if it goes down for even a few hours, it's possible to bring as many as half a dozen development programs to a halt."

Since Tektronix is a full service organization "and not just a chip maker," it provides well-trained people who "really know the system" when it comes to field service, Pierson said.

When the system goes down, a field service engineer can be on-site at Flight Systems on the day the problem occurs and get it up and running within hours.

The 8002 is easy to use, he said. The designer enters his program and edits it. The program is converted to the object code for the target microprocessor and this code is stored on disk. The program is then debugged while it runs on the emulator microprocessor.

By plugging a cable into the socket where the actual microprocessor will be inserted in the prototype, the user gains access to all the I/O circuitry of the prototype, while using the system's memory for program storage. When the user is satisfied, he can transfer the program to Prom.

Afips Plans Micro Festival

Call for Participants

MONTVALE, N.J. — A call for participation in the Personal Computing Festival to be held next year at the National Computer Conference (NCC) in New York City has been issued by the American Federation of Information Processing Societies (Afips).

The overall theme for the festival will be "Is it worth it?," Afips said, explaining that issues to be examined include the impact of personal computing on individual lives, families and society in general. Topics of discussion will also include cost of acquiring technical expertise, maintaining and improving technology and using technology to solve problems.

Those interested can participate in the festival by presenting a paper, giving a talk, organizing a panel or delivering a tutorial, Afips added.

Among the many topics suggested for consideration at the festival are personal computer networks, artificial intelligence, robotics, speech recognition, role of the appliance computer and marketing personal computer products. Other subject areas could include personal finance systems, home education systems, computer music and computer art, new I/O devices, computer phobia and amateur research.

The festival will be held June 5-7 at New York's Americana Hotel, Afips said, adding that potential participants should send a "letter of intent" as soon as possible, but no later than Feb. 1, to Jay P. Lucas, 3409 Saylor Place, Alexandria, Va. 22304. This letter should include an abstract and a brief biography.

Papers presented during the festival will be published. Potential authors will be mailed a "festival author's kit" containing instructions and necessary materials for preparing papers in camera-ready format, Afips continued. Papers submitted for consideration must be received by March 15 in the specified format. The papers will be reviewed and authors notified by May 1.

Session leaders should submit a brief abstract describing either the scope of the proposed session or the tentative title of the presentation by Feb. 1 and the prospective organizer should submit a list of proposed participants, their affiliations and a brief biography of each, Afips said from 210 Summit Ave., Montvale, N.J. 07645.

Clarification

SAN ANTONIO, Texas — Vanguard Systems Corp. is the firm that announced an APL software package for microcomputers. The system was demonstrated at the National Computer Conference last June on a Digital Group Computer, according to Gary Dawkins, Vanguard president.

Digital Group is a Denver firm.

Called APL Z-80, the software costs $300, Dawkins said, adding that people may have confused his system with that rumored to be available from Microsoft [CW, Aug. 14].

Vanguard is at 6812 San Pedro, San Antonio, Texas 78216.

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Single-Board Control Unit Bows

HERMOSA BEACH, Calif. — Microproducts has introduced a single-board control computer that is a microprocessor control system and a microcomputer in one package, according to the company.

The board is fully socketed and provides expansion to 4K random-access memory (RAM) and 16K erasable programmable read-only memory.

The board has a large prototype area suitable for mounting analog-to-digital, digital-to-analog converters, relays and other interface devices.

Superkim is compatible with all Kim-1 software and most Kim-1 and Apple II hardware interfaces, according to the firm.

The Superkim costs $395 from Microproducts, 1024 17th St., Hermosa Beach, Calif. 90254.

Basic Interpreter Supports Zilogs

CUPERTINO, Calif.— An extended Basic interpreter from Zilog, Inc. gives the firm's microcomputer and development system users the ability to interactively enter, edit, run and debug programs within the Basic interpreter subsystem.

The interpreter supports the firm's MCZ series, which includes the MCZ-1/05, MCZ-1/60 and MCZ-1/90 microcomputers, and its development systems — the 4 MHz, ZDS-1/40 and 2.5 MHz ZDS-1/25.

Zilog's Basic allows the user to manipulate real, integer and string data with full file capabilities, including string and record random access.

Two math packages are included — a binary package with seven digits and a binary coded decimal data version with 13 digits.

The interpreter interfaces with the firm's Z80-based microcomputer operating system.

The Basic interpreter costs $200 from Zilog, Inc. 10460 Bubb Road, Cupertino, Calif. 95014.

Unit Lets S-100s Do Several Tasks

TALLAHASSEE, Fla. — The Multitasker, an interrupt handling board, has been introduced by Objective Design, Inc. to help S-100 computers handle simultaneous problems, according to the company.

The interrupt drive system allows a user to handle program development of several terminals at once, run household appliances and play games at the same time and continue using the computer while a slow printer is churning out a listing, the firm said.

The Multitasker does not use forced "Restart" instructions but can be located anywhere in memory and will generate "Call" vectors to any location.

Multitasker without Prom in kit form costs $205.95 from Objective Design, Inc., P.O. Box 20325, Tallahassee, Fla. 32304.

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Threaten to Leave Federal Market

Vendors Oppose I/O Interface Standard

By Edith Holmes
CW Washington Bureau

WASHINGTON, D.C. — Several major computer equipment suppliers threatened withdrawal from the federal marketplace here during recent hearings on the government's intention to make three I/O channel-level interface standards mandatory.

Led by the Computer and Business Equipment Manufacturers Association (Cbema), Burroughs Corp., Control Data Corp., Digital Equipment Corp. and Hewlett-Packard Co. told the National Bureau of Standards (NBS) they would have to decide just how much the government's business meant to them if they were forced to adhere to the standards, acknowledged to be essentially IBM's interface designs.

Honeywell Information Systems, Inc., however, flatly informed NBS it would be compelled to withdraw from bidding on new federal computer systems procurements if this family of standards is required.

Appearing before the NBS Institute for Computer Sciences and Technology to testify in favor of the adoption of the I/O channel interface standards, the Computer and Communications Industry Association (CCIA) called the manufacturers' opposition an effort to keep their CPU and peripheral offerings "bundled."

The benefits of peripheral equipment competition that federal users of IBM installations have enjoyed are not available to those agencies using Burroughs, CDC, HIS, NCR Corp. and Univac Systems, A.G.W. (Jack) Biddle, CCIA president, said.

The equipment manufacturers view the plight of the user differently, however. "The user will suffer from adoption and enforcement of the proposed Federal Information Processing Standards (Fips) because the systems with most modern technology, with the greatest innovation, will suffer increased cost and degraded performance," Edward Lohse, Burroughs' director of engineering operations, stated.

Manufacturers' Argument

Burroughs, CDC and the others argued that their efforts to make their systems conform to the I/O channel interface standards will divert R&D dollars from future technologies and will lower the performance and reliability of their hardware.

Product prices will also go up, they warned. "For computers manufactured by [DEC], the proposed standards mean adding a complex piece of hardware, not merely redesigning an existing I/O channel," Patricia White, DEC's manager of standards, said. "It would be naive to assume that this cost would not be reflected in the price of the system," she added.

Cbema went so far as to predict that all the users of these systems will see increases in their costs as a result of the "government-only" specifications the association believes would result from the adoption of the standards.

In addition to "driving many U.S. equipment vendors from the government marketplace," the standards would invite foreign competition, according to Burroughs.

"Several leading Japanese computer manufacturers have already adopted this architecture since they manufacture 'IBM plug-compatible' products," DEC's White said. "The proposed standards, therefore, will give Japanese companies a built-in cost advantage in competing for U.S. business."

She also suggested that some countries might consider the proposed I/O channel interface standards to be a nontariff trade barrier set up by the U.S. to exclude their products. These nations could retaliate by restricting the sale of U.S. computers in foreign markets, thus harming the industry's positive contribution to the U.S. balance of payments.

'Mixing, Matching'

Supporters of the standards have maintained that they will encourage federal users to employ multiple-vendor systems — systems which often cost less than those provided by a single manufacturer. But Cbema president Vico E. Henriques contended that "the ability to mix and match' already exists for computer systems, and where appropriate, such systems are already functioning in the federal establishment."

HIS went even further in its statement, questioning where users would place responsibility for benchmarking mixed systems, for certifying and maintaining them. Mixed systems "would cost more to assemble, administer and maintain . . . than integrally designed" computer installations would, Irma M. Wyman, director of central staff for HIS' U.S. computer operations, stated.

Calling the proposed I/O standards "technologically regressive," Wyman predicted they will lead to decreasing competition, "leaving the federal market to IBM and its existing imitators."

(Continued on Page 64)

Third U.S.-Japan Conference To Include Catalog Exhibit

MONTVALE, N.J. — Vendors of computer hardware, software and services are invited to a catalog exhibition at the Third U.S.-Japan Computer Conference in San Francisco. The conference is sponsored by the American Federation of Information Processing Societies (Afips).

Product catalogs, capabilities brochures and data sheets will be in a room adjacent to the conference's technical seminars, according to an Afips spokesman. Copies of the literature will not be available for attendees to take with them but can be mailed to them after the show by the vendor, the spokesman said.

The catalog exhibition is seen as "not only an excellent vehicle for increasing a company's penetration into the growing Japanese computer market, but also as ideal for those not yet marketing there to measure the market and to explore its immediate and future potential.

"In 1973 the total Japanese market for computers and related equipment was $2 billion, of which only approximately $300 million were imports," the source continued. The market grew by 12% in 1975 and by 35% in 1977, he noted, when revenues approached $6.5 billion. "The market is expected to grow steadily at an average annual rate of 18% beginning in 1979," the spokesman added.

The conference is slated for Oct. 10-12 at San Francisco's Jack Tar Hotel. Catalog exhibit space costs $300 per exhibitor, according to Exhibits Chairman Ted E. Lorber, who can be contacted at Datum, Inc., 1363 S. State College Blvd., Anaheim, Calif. 92086.

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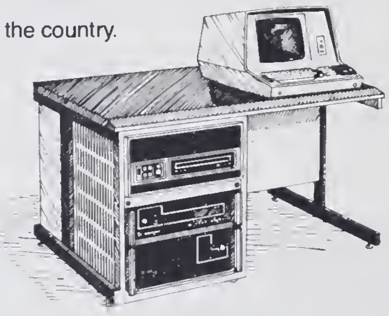

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AT&T Consent Decree Subject of Inquiry To Justice Department

By Edith Holmes
CW Washington Bureau

WASHINGTON, D.C. — A congressional subcommittee has asked the Justice Department for an account of its efforts to enforce the 1956 Consent Decree against AT&T.

Complaints by an industry association that the Bell System's offerings in the DP terminal and software markets violate the 22-year-old injunction that AT&T provide only telecommunications services prompted the request by the House Small Business Committee's Subcommittee on Antitrust, Consumers and Employment during a recent hearing here [CW, July 24].

John H. Shenefield, Assistant Attorney General of the Justice Department's Antitrust Division, pointed out the department is investigating charges by the Computer & Communications Industry Association (CCIA) that AT&T is attempting to enter the DP business. He assured the subcommittee of his belief that "the future of small business . . . will depend in large measure on vigorous and effective enforcement of the antitrust laws."

While he applauded Shenefield's statements, CCIA president A.G.W. (Jack) Biddle contended "the Consent Decree enforcement program of the Department of Justice has been ineffective in ensuring competition, at least in the computer and communications industries.

"The Antitrust Division's Judgment Enforcement Section, with only 38 employees, cannot possibly police adequately the more than 825 Consent Decrees outstanding," Biddle said. "The department must rely heavily on self-reporting provisions contained in the decree to ensure compliance. Allowing the fox to guard the hen house has never had a beneficial effect."

Tariot Testimony

The CCIA's assertion that smaller competitors can spend millions of dollars on R&D for new products only to find themselves later in direct competition with offerings by the company violating the decree seemed borne out by the testimony of Incoterm Corp. chairman Jean N. Tariot.

In his appearance before the House subcommittee, Tariot stated that his company's merger with Honeywell, Inc. earlier this year is a direct result of AT&T's terminal offerings. The Bell System's Dataspeed devices and its recently announced 4500 line, an intelligent, user-programmable terminal family, led Incoterm to conclude that its continued existence as an independent supplier of intelligent terminals was not a viable alternative.

"Since our own merger, it may interest you to note that other terminal companies have followed the same path, although not necessarily for the same reasons as Incoterm," Tariot told the congressmen. Sycor and Data 100 have either been acquired or are in the process of being acquired by Northern Telecom, a subsidiary of the Bell System of Canada, and Courier, which is now a subsidiary of ITT, he stated.

Tariot asked the subcommittee to consider whether these mergers are in the best interest of the free enterprise system. In his statement opening the hearing on consent decree enforcement, Rep. John B. Breckinridge (D-Ky.) noted the view of such prominent economists as John K. Galbraith that "the increased merger activity undertaken by the giant corporations is the primary culprit behind the gradual erosion of the healthy, competitive environment which small business needs to thrive."

Antitrust Laws 'Flexible'

"Our experience has demonstrated that the fundamental principles of existing antitrust laws are both broad and flexible enough to protect the ability of small business to compete fairly in the marketplace," Shenefield said. But, he added, there is a need for legislative action to implement these principles effectively.

For example, the antitrust division supports legislation that would extend the coverage of the Clayton Act to mergers and acquisitions that affect interstate commerce, in hopes of preventing combinations that would lead to monopolies and restraint on competition.

Shenefield also said the Justice Department would like to see a clarification of the use of "collateral estoppel" in antitrust cases — a doctrine which prevents a defendant from relitigating issues that have been decided fully and fairly in an earlier trial.

The use of this doctrine would be particularly beneficial to small businesses that can least afford the expenses of prolonged litigation and that might benefit, therefore, from a suit already concluded between a large corporation and the U.S. government, Shenefield suggested.

(Continued on Page 64)

Some Passing Up Opportunities

Who Will Exploit Growing European Market?

By Don Ryder
Special to CW

LONDON — An analysis of U.S. competition in the Western European peripherals marketplace suggests that smaller U.S. suppliers are passing up opportunities. These facts were revealed following the announcement that the recent Computer Peripheral Show would be the last at the U.S. Trade Centre here, which is closing for budgetary reasons.

For example, only three of the 50 U.S. firms exhibiting at the show displayed floppy disk drives. Yet the UK floppy disk market is said to be one of the fastest growing in Europe, with annual shipments predicted to rise from 17,600 units in 1978 to 403,000 units by 1982. And, according to a study, *Peripherals in Western Europe,* recently published by IDC Europa, even excluding the word processor market, total floppy disk drive shipments to the Western European countries this year will reach 100,700.

IDC Europa reported the Western European peripherals market is a lucrative one for participants. Apart from floppy disk drives, other key product categories that will chalk up

(Continued on Page 66)

PRODUCT CATEGORY	BASE Jan. 1, 1978	BASE Jan. 1, 1982 (Predicted)
Character Printers	67,100	149,300
Other Low Speed Printers	66,050	136,100
Very High-Speed Printers (rated at 8,100 line/min or equivalent)	—	800
Low-Speed Tape Drives (under 25 in./sec)	9,580	22,000
Disk Cartridge Drives	128,500	261,500
Tape Cassette Drives	129,800	255,500
Very High Performance Disk Drives	2,000	20,200
All Disk Drives	241,000	465,800

Table 1. Key Product Categories

Percent Hardware Spending for:	Medium	Small	Mini	Small Business Systems
Disk	20.3%	22.6%	17.3%	6.4%
Tape	6.8%	2.6%	5.7%	1.0%
Printer	7.8%	12.6%	9.7%	12.9%

Table 2. Hardware Spending

At Sites With	Big CPUs	Medium CPUs	Small Business Systems	Minis
Sales to End User				
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Type V Printers (Speed over 2,100 line/min)	Good	Very Good	Poor	Very Good
Sales to OEMs				
Mini Disk Drives	Poor	Poor	Very Good	Good
Type II Printers (Speed under 599 line/min)	Very Good	Good	Very Good	Very Good
Floppy Disk Drives	Very Good	Good	Good	Good

Table 3. Key Growth Markets

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AT&T, GTE Oppose Divestiture Proposal At House Hearings

By Edith Holmes
CW Washington Bureau

WASHINGTON, D.C. — AT&T and General Telephone & Electronics Corp. (GTE) recently contended before a congressional subcommittee that forced divestiture of their manufacturing and supply subsidiaries "would fragment the technological coordination behind the world's finest telecommunications network."

Testifying at the House Communications Subcommittee's Hearings on H.R. 13015, "the Communications Act of 1978," the telephone companies argued for the continued vertical integration of their enterprises. They asked the congressional panel to delete that section of its bill that would result in AT&T's divestiture of Western Electric Co. and GTE's severance of Automatic Electric, Inc. and GTE Lenkurt, Inc.

However, many others appearing before the subcommittee chaired by Rep. Lionel Van Deerlin (D-Calif.) supported this goal of H.R. 13015.

While he was not prepared to offer the Carter Administration's position on the proposed legislation, Assistant Attorney General of the Justice Department's Antitrust Division John H. Shenefield said he believes the requirement that telephone companies engaged in monopoly operations divest all or part of their equipment manufacturing operations "makes good competitive sense."

This section of H.R. 13015 "addresses one of the bottlenecks that gives AT&T the incentive and ability to prevent competition — the interrelationship between owning telephone operating companies and owning telephone equipment suppliers," Shenefield stated.

Addressing the concerns of International Telephone and Telegraph Corp. (ITT), Senior Vice-President Frank P. Barnes called the telephone industry's "total system" or vertical integration approach "merely a justification . . . to purchase [its] equipment requirements from affiliated manufacturing entities without regard to competition or to quality and cost-effectiveness." Telephone ratepayers have been denied the many benefits that flow from equipment competition as a result, Barnes said.

'Possible First Step'

While he labeled the divestiture provision in the proposed act "a possible first step," the ITT official also suggested the Federal Trade Commission study the structure of the regulated common carrier market since simply divesting Western Electric would leave intact the huge market share it currently enjoys.

Under a closely related provision of the Communications Act of 1978, the telephone companies, while serving their equipment manufacturing operations, would also be permitted to diversify into fields "incidental to" telecommunications, including DP, through subsidiaries.

AT&T and GTE had little comment to make concerning this part of the proposed legislation. Others, however, including Shenefield, Federal Communications Commission (FCC) Chairman Charles D. Ferris and Computer & Communications Industry Association (CCIA) Vice-President and General Counsel Philip S. Nyborg took up this issue, which would essentially repeal the 1956 Consent Decree limiting AT&T to the provision of regulated common carrier services.

"This 'divestification' section . . . has triggered the concern expressed by a variety of firms that they will now be 'swallowed' or 'steamrollered' by the telephone industry and, more specifically, by AT&T," Shenefield noted. "These fears are not to be lightly dismissed," the assistant attorney general said, but he was not prepared to offer the Justice Department's views on elimination of the Consent Decree just yet.

FCC Chairman Ferris pointed out his commission currently views the Consent Decree against AT&T as a major obstacle to the resolution of the Second Computer Inquiry — the FCC's effort to distinguish between regulated communications offerings and unregulated DP services. "The decree presently constrains the commission from expanding full and fair competition because of the prospect that not all carriers may be permitted to provide certain equipment and services on a fully competitive, but nontariffed, basis.

"There is a compelling need for Congress to take action to remove the market barriers created by the decree," Ferris added. He suggested the FCC has missed clarification of the decree's intent from the courts and the Antitrust Division [CW, July 24].

The CCIA, however, objected to this part of the bill which "would create strong incentives for a monopoly carrier to subsidize the competi-

(Continued on Page 65)

Company President Warns

Japanese Taking Aim at Semiconductor Market

By Howard A. Karten
CW Staff

SAN DIEGO, Calif. — Japanese industry, partly in conjunction with the government of Japan, has picked out the U.S. computer industry as its next target for competition, according to Charles Sporck, president of National Semiconductor Corp. in Santa Clara, Calif.

Sporck, interviewed here recently at a press briefing, said the Japanese electronics companies plan to compete vigorously with U.S. computer manufacturers via the semiconductor industry.

"An American business carrying the same debt-to-equity ratio often carried by Japanese companies would be driven to bankruptcy. [However], if a Japanese company is one of the 'chosen ones' [i.e., favored by the government] it has no trouble getting money from banks," Sporck said. This, in part, helps explain why Japanese companies can compete so effectively.

"The history of the past 30 years shows that [when Japanese industries decide to compete with U.S. industries] they never fail," Sporck said, despite profit margins that he called "terrible." This means the business threat posed by the Japanese is a very real one for all industries in the U.S., especially the semiconductor industry.

Part of the difficulty faced by American industry lies in spending on R&D, Sporck, said. Although the semiconductor industry in this country spends a high percentage of sales revenues on R&D efforts, an even higher percentage is spent by Japanese industry, with much of the development work there orchestrated and coordinated by the Japanese government. "The Japanese government says to companies, 'You will work in this area,' and the research efforts are not competitive," as they are in this country, Sporck said.

Asked whether this would be a feasible approach in this country, Sporck said no, citing the amount of competition between different companies. As a solution, however, he suggested the government should apply the same importing rules and tariff rates to everyone.

Broad-Based Goals

In other remarks, Sporck and other high company officials said National Semi is presently investing heavily in new product development, and the company's objective is to build a broad-based semiconductor business. As part of this philosophy, the company recently introduced the System/400 [CW, May 8], intended to run IBM S/370 software but carrying a price tag significantly below that of comparable IBM hardware. This strategy is contingent upon IBM's continuing to support evolution of hardware and software, and not revolution, Sporck noted.

Discussing this move into the production of computer systems, Sporck said it is no longer possible to differentiate between complete systems and discrete components, and the drive to solve systems problems, as opposed to only a small portion of those problems, is the basic policy of the company.

In a tour of the company's computer manufacturing facilities here, top officials repeatedly stressed the company's intentions in two areas — price/performance leadership and attention to quality control.

David Martin, vice-president of the company and general manager of its Computer Products group, added that a dedication to service and reliability was essential because of the effects of competition with the Japanese and the costs of nonreliability.

This was evident in the company's capital expenditure plans for the future. Capital expenditure will more than double this year, Sporck said, to $90 million, including the rebuilding of a semiconductor production plant in Scotland that burned down last year. Rebuilding of this facility will increase production to three to four times what it was previously. In addition, the company will be doubling its production area in this country, Sporck said.

In discussing some of the factors contributing to the company's success — National is the only broadline supplier to enter the semiconductor business successfully in the past 15 to 20 years, Sporck noted — the company president said he tried to deemphasize formality. Sporck and other company managers repeatedly emphasized the attempt to tone down formality and indications of rank or privilege at the company.

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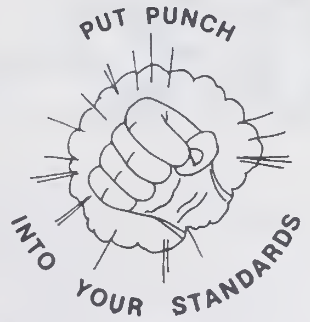

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Justice Asked to Report on Effort To Enforce AT&T Consent Decree

(Continued from Page 60)

Focusing on the ways in which the Justice Department might assist small business through active enforcement of consent decrees, Biddle maintained business cannot properly plan future programs and products in competition with consent decree defendants without knowing if the decree can be counted on for protection.

He also stated that the lack of consent decree enforcement compounds the shortage of investment capital for small competitors. "Who will recommend investing in, who will invest in, who will lend to a company whose future can be wiped out at any moment by a monopolist corporation that can violate the letter or the spirit of its consent decree with impunity?" Biddle asked. "Certainly not the prudent man."

More Funds Urged

The CCIA recommended that Congress increase the Antitrust Division's appropriations and that it earmark a specific amount for the Judgment Enforcement Section. Congress should also establish a provision for publicly reporting the findings and investigations of decree compliance and for taking into account specific complaints of violations, Biddle stated.

Congress could ensure that the Antitrust Division makes use of enforcement aids outside the Justice Department, the CCIA president continued, specifying the Federal Trade Commission. Because of the Antitrust Division's inability to enforce the consent decrees against corporations like IBM and AT&T, Biddle added that Congress should allow third parties the right to sue to enforce the provisions of the decree themselves. Such a measure "would do much to ensure a defendant's compliance with the terms of the decree, since the defendant would be faced with the prospect of litigation from many sides if it did not live up to the provisions of the decree."

CA Signs Pact

IRVINE, Calif. — The Commercial Systems Division of Computer Automation, Inc. has signed a master purchase agreement with The Continental Insurance Companies under which Continental plans to purchase Syfa network processing systems equipment valued in excess of $10 million.

Ivan Socher, general manager of the Commercial Systems Division, said that when installed, the network could represent the largest single order yet placed by an insurance company for this type of equipment.

Socher said Continental plans to install the Syfa systems in its branch offices, forming a data network across the U.S. The individual systems will be used principally to automate office functions such as data entry and editing for insurance applications.

The first three systems have been installed for development and training purposes. Installation in the Continental branch offices will start in the fourth quarter of 1978 and extend through 1979.

Suppliers Object to I/O Standard

(Continued from Page 59)

Cbema and the manufacturers noted that with the migration of more and more functions from the CPU to peripherals, the I/O standards have come too late and the attention focused on them is misplaced. NBS would better spend its time developing programming language standards or data communications interface standards or standards for the "bus" structure that many of the manufacturers said they believe will replace the CPU by switching messages between intelligent peripherals.

Standards Support

Testifying in support of the proposed standards, Norman J. Ream, former director of the NBS Computer Institute, said he first heard these same arguments from the major computer equipment suppliers 15 years ago. "Unfortunately, a segment of the DP manufacturing community has always been violently opposed to such standards. One need not dwell on their reasoning for it is basically market control-oriented rather than technological," he stated.

Among those manufacturers who are marketing the interfaces NBS hopes to standardize, but who voted against their adoption even as voluntary standards, are CDC, IBM, Xerox Corp., Univac and Recognition Equipment, Inc. These aren't the "plug-compatible" manufacturers, Ream added.

"Idle Threats"

The former Institute director called Cbema's and the manufacturers' threats to leave the federal market should the I/O channel interface standards be adopted "idle" and "unfortunate" but suggested "there are adequate sources of supply available within our nation as to [prevent any] severe problems in government operations."

Ream and the CCIA predicted the advantages following the adoption of the standards would include increased and open competition between qualified suppliers, improved operations and reduced cost through more multivendor installations, improved utilization of government-owned equipment and protection of the federal investment from the marketing strategy of large systems manufacturers with their early and planned equipment obsolescence — resulting in sole-source procurements or huge conversion costs.

Biddle estimated that before long, competition at the peripheral level could result in savings of $80 million per year to the U.S. government. He urged NBS to adopt the standards and to move aggressively forward to establish standards in areas from encryption to the architecture involved in putting together networks involving DP and communications standards and protocols.

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Report Sees 46%/Year Growth in Desktop CPUs

WELLESLEY, Mass. — The market for desktop computers will grow at an annual rate of 46%, increasing from 17,600 units valued at $243 million in 1977 to 276,000 units valued at $1.8 billion by 1983, according to a study recently published by Venture Development Corp. (VDC).

Although the report put its 1983 forecast at $1.8 billion, it also offered a "minimum" projection of $1.37 billion and a "maximum" forecast of $2.2 billion.

While the major uses of these computers today are in scientific and engineering applications, VDC forecast that after 1980, the desktop computer will gain much wider use in small companies.

VDC estimated the demand for desktop computers for scientific purposes will show an annual growth rate of 31%, but the demand for general-purpose business desktop computers will progress at a 52% annual growth rate during the next five years. Lower prices and more comprehensive software expected by that time will swell the business demand for desktops, VDC reasoned.

Hewlett-Packard Co. currently has the largest installed base of desktop computers, but VDC suggested IBM will become the leader in desktop sales, particularly in the small business sector.

VDC estimated HP now holds 23% of the total units installed, with IBM tying Wang Laboratories, Inc. for 21% and Tektronix, Inc. close on their heels with 19%. But, in market dollar value, VDC's report noted IBM rates first with 31%, followed by Tektronix with 22% and Wang and HP each holding 20% of the dollar share of the market.

Noting that sales of IBM's initial entry into the field, the Model 5100, have been disappointing only by IBM's standards, VDC stated that nearly 5,000 of IBM's 5100s have already been installed in the U.S. for an aggregate value of $90 million.

With the introduction of the improved model 5110 with floppy disk auxiliary storage, VDC claimed IBM has a product with sales potential limited only by the giant's production capacity.

Desktop computers, as defined in the study, are complete microprocessor-based systems selling for less than $10,000 which are relatively easy for people without extensive computer training to use.

The desktop computer, the report commented, differs not so much because of its configuration as a typewriter-sized package but because of its simplicity.

The study is available from VDC at One Washington St., Wellesley, Mass. 02181.

AT&T, GTE Buck Removal Of Manufacturing Arms

(Continued from Page 62)

tive DP offerings of its subsidiary and for any common carrier — monopoly or competitive — to discriminate in providing interconnect or access to its transmission facilities against firms competing with its subsidiary," Nyborg stated.

The association recommended monopoly carriers not be allowed to offer competitive services or manufacture DP and communications equipment themselves or through subsidiaries.

Still another organization appearing before the House Subcommittee questioned the wisdom of a broad provision in the bill that would grant the new regulatory authority — the Communications Regulatory Commission — the right to create a monopoly in the competitive interstate telecommunications market.

Representing Southern Pacific Communications Co., MCI Telecommunications, U.S. Transmission Systems, Satellite Business Systems, Telenet Communications, Graphnet Systems, Midwestern Relay Co. and Western Telecommunications, Inc., the Ad Hoc Committee for Competitive Telecommunications (ACCT) said its members "will compete toe to toe with the established interstate telephone industry anywhere . . . anytime."

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Europe Peripherals Mart Ripe for Competition

(Continued from Page 61)

substantial gains in installed base between 1978 and 1982 are shown in Table 1 on Page 61.

Despite these opportunities, many U.S. manufacturers appear to be leaving the European market to European or Japanese rivals or price-cutting local distributors carrying duplicate product lines. For example, at this year's Hannover Fair, only 13 of 48 exhibitors showing floppy disk drives were U.S.-owned organizations.

Spending Spree

The total size of the European peripherals market is impressive. According to IDC Europa, total hardware spending in Western Europe will more than double from last year's $9.32 billion to $21.23 billion by 1982. Disk tape and printer peripherals will claim a big chunk of this spending, particularly for medium and small systems. The figures for hardware spending are shown in Table 2.

The key growth markets, according to IDC Europa, are shown in Table 3.

One of the purposes of IDC Europa's study was to chart the dimensions of the European peripheral products market by region and by industry for different opportunity areas for U.S. export use.

The different trends in peripheral acquisition for different size sites will create some special growth opportunities in specific regional markets and industries. For example, IDC Europa predicted the growth of new small business systems together with associated peripherals in the UK in the period 1978-82 will outrun the European growth rate.

The number of installations will almost triple from 17,200 in 1978 to 50,300. Similarly, Scandinavia will experience a dramatic surge in minicomputer installations from 5,330 in 1978 to 16,800 in 1982, and correspondingly the miniperipheral market there will boom, IDC Europa said.

Among other growth sectors, the European retail sector will install a proportionally high number of tape cassette drives as point-of-sale automation becomes more popular. Shipments to this sector will rise from 4,800 in 1977 to 11,000 by 1982. The European banking sector will require 35,900 floppy disk drives in 1982, up from 13,800 in 1977.

However, the feeling here is that as big as the market is, it will largely be left to the largest U.S. suppliers, with the European manufacturers far behind. This impression is confirmed by IDC Europa data which shows that independent peripheral acquisition by both OEMs and PCM customers follows this pattern.

For example, only one of the leading independent tape drive manufacturers is of European origin, with the large U.S. firms claiming most of the market. IDC Europa's sample of OEM suppliers of tape drives included Pertec Computer Corp.; Wangco, Inc.; Ampex Corp.; and Kennedy Co. PCM suppliers included BASF Systems, Inc.; Storage Technology Co.; Control Data Corp.; and Telex Computer Products, Inc.

CSC Awarded Medi-Cal Pact

EL SEGUNDO, Calif. — Computer Sciences Corp. (CSC) has been awarded a $129.6 million, five-year contract by the state of California to process claims for the state's Medi-Cal program, a state version of Medicaid.

The contract, which will begin Sept. 1, is the largest service contract ever let by the state, a California procurement official said.

CSC will serve as the fiscal intermediary between the Department of Health, which administers the program, and the hospitals, clinics, pharmacies, doctors and others who provide health-care service to the state recipients. Currently, more than 80 million claim transactions are processed annually.

In its role as fiscal intermediary, Computer Sciences will verify providers' claims and establish the amount due in addition to providing management, administrative and utilization reports for more efficient monitoring methods.

CSC plans to use a Medicaid Management Information System (MMIS) with procedures for processing drug claims, long-term care, in- and out-patient care and medical treatment.

The system will be implemented on a phased basis beginning next June and is scheduled to be fully operational in March 1980.

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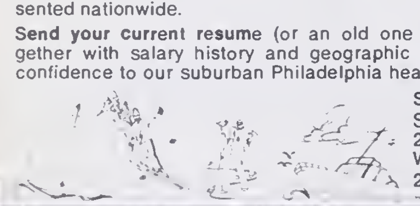

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CANDIDATE MUST BE A N.Y.C. RESIDENT WITHIN 90 DAYS OF EMPLOYMENT. FOR IMMEDIATE CONSIDERATION PLEASE SUBMIT YOUR RESUME INCLUDING SALARY HISTORY TO:

Personnel Officer
M.I.S.D.
1 Police Plaza Room 700
New York, N.Y. 10038

Senior Software Technical Writer for Manufacturing of Computer Terminals

Duties include complete documentation of company's new products, producing internal and external documentation systems, producing market oriented and technical documentation for a varying readership, coordinating the production of source program microfiche for all system components. Experience and qualifications: 5 years strong technical writing experience with 2 years experience in documenting software programming. Extensive knowledge and understanding of high level computer language including remote terminal language, understanding of hardware and software systems. $23,100/year - 40 hour work week. Resumes only.

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Responsible for the design, coding, testing, documentation, and follow-up support of a multiuse main frame operating system.

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Overall system design, code generation and optimization opportunities in compiler development.

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Responsible for the definition, design, implementation, testing and documentation of data base management, query/retrieval and reporting software. (Experience with Honeywell IDS-11 or CODASYL data base systems desirable).

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Analysis, design, implementation, testing and documentation for TP development effort. Applicant should be familiar with the human factor and operating systems interface, privacy and security control recovery considerations, statistic gathering, forms presentation and processing, and data entry and display devices.

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Responsible for development techniques and methodology for CP-6 Testing.

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Technical school training preferred. L66/GCOS or Sigma 7/9 experience desirable.

Programming applicants should have a degree in Computer Science or equivalent. Experience with higher level implementation languages is desirable, as is experience on Honeywell or Xerox large systems.

Please send resume and
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Honeywell Information Systems
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Immediate opening for a systems programmer with three to five years experience. The qualified candidate should be able to install and maintain systems software on a CDC CYBER 70 Series computer. A thorough knowledge of FORTRAN, COMPASS and PP COMPASS is required. NOS/BE background desirable.

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Excellent starting salary, complete company paid benefits including relocation. Submit resume (salary history a must for consideration) to:

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Manager Employment
Saxon Business Products, Inc.
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saxon

VALLEY NATIONAL BANK

At Valley National Bank we have a sense of pride in our growth and our state. We are the largest bank in the Rocky Mountain States with over 3 billion in assets and 180+ branches. We are located in a state that offers one of the most desirable locations anywhere.

This sense of pride is carried on in the work our 5000+ employees do for us. Our growth is measured by the success of the people who are Valley National Bank . . . our employees. If you qualify in the following areas . . .

MULTIPLE CPU Environment

IBM 370/158 & 168, OS/VS, COBOL &/or ALC

* ATM Project Leader-Mini Computers

Knowledge of DB/DC systems, communications hardware & systems analyst experience required. Need strong communications skills. Prefer 3-5 years programming experience. ATM/EFTS required.

* Programmer/Analyst-Terminal Oriented Systems

Knowledge of D/B systems, systems analyst experience required. Need strong communications skills. Approximately 70% analysis-30% programming involved. Systems usually involve D/B file. Prefer 2+ years programming experience.

* Programmers/Analysts-Bank Applications Experience

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YOU'RE THE TYPE OF PROFESSIONAL WE NEED, IF YOU . . .

- know software — PL/I, BASIC, COBOL, FORTRAN, assembler, time-sharing, operating systems, digital communications, and/or data base management.
- discipline yourself — to analyze problems, define goals, and apply your skills methodically.
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DTSS incorporated develops and licenses the Dartmouth Time-Sharing System. DTSS software is used by Fortune 500 firms and computer service bureaus worldwide. We're located in a unique rural/cultural environment, with Boston and New York easily accessible by interstate highway and direct flights. Our employees have frequent travel opportunities.

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DATA PROCESSING

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SCIENTIFIC SYSTEMS PLANNER

You should have at least 8-10 years' experience in CDC scientific systems and a technical degree or equivalent. The work functions will include system design, selection and procurement with performance monitoring to be done on existing and future systems. Knowledge of scientific data base systems is desirable.

BUSINESS SYSTEMS PLANNER

You should have at least 8-10 years' experience in IBM 360/370 (or equivalent system). An appropriate degree or equivalent experience is required. The work functions will include system design, selection and procurement with performance monitoring to be done on existing and future systems. Knowledge of data base management systems is desirable.

COMMUNICATIONS SYSTEMS PLANNER

You should have at least 5-10 years' experience in remote batch and interactive communications. Both large scale system and minicomputer background is desired. A technical degree or equivalent experience is required. The work functions will include system design, selection and procurement. Network performance monitoring will be done on the existing or future networks.

SENIOR SYSTEMS PROGRAMMERS

You should have at least 5-8 years' experience in the analysis, development and maintenance of system software for the CDC CYBER 173 computer system. A technical degree or equivalent experience is required. Knowledge of software internals and proficiency in the maintenance of the CDC CYBER operating systems is required to perform functions of software development and maintenance.

COMPUTER TRAINING COORDINATOR

You should have at least 5-8 years' experience working with CDC CYBER software, user method development, and user interface functions. A technical degree or equivalent experience is required. Work functions include developing/maintaining CYBER system user methods, system information bulletins/manuals and interfacing with users to identify, analyze and design software requirements.

Responsibilities will include the development of effective training programs for computer operations personnel, including computer operators and data entry personnel. Candidate should have a degree in Computer Science/Mathematics, or equivalent experience, with at least 3-5 years' experience in operating large scale IBM and CDC computer systems. Should possess effective communication skills.

The Idaho National Engineering Laboratory has installed a CDC CYBER 76, a CYBER 173, and an IBM 360/75 in its Computer Science Laboratory. The Computer Science Laboratory has the responsibility for hardware and software configuration planning and the operation of the present system.

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This is an opportunity for the right person to design, develop, implement and manage the full range of management information systems for a new $50-million organization. Selected applicant will be part of a supportive management team that is interested in developing modern information systems to meet our management needs. Education and training in computer science and business systems. MBA with a management information systems orientation preferred. Four to five years in programming, systems programming, systems analysis and design, preferably in a minicomputer environment. Exposure to hardware selection and some management experience in systems development.

Send resume with salary history to Ms. Hitt, THE BOSTON WATER AND SEWER COMMISSION, 10 Post Office Square, Boston, MA 02109.

The Boston Water and Sewer Commission is AN EQUAL OPPORTUNITY EMPLOYER. Local Laws require residency in the City of Bostoon for all employees of the Commission.

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David Sarnoff Research Center
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As the central research activity of RCA Corporation, we are expanding our efforts to meet RCA's growing needs in the software and microcomputer systems area. We have immediate openings that will challenge your talents and imagination in hardware, software and system design.

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A degree (preferably M.S. of Ph.D.) in Computer Science, Computer Engineering, Electrical Engineering, or other relevant area.

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Openings are available for a variety of levels of experience, from recent graduates to senior engineers. Your experience/interest should qualify you to solve challenging system design problems in some of the following areas:

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Our Princeton location affords a rural/suburban surrounding, with exceptional cultural and recreational opportunities.

If your background matches your needs, we would welcome the chance to get to know you better. Send us your resume; we will reply promptly.

Correspondence should be directed to:

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Manager, Employment
Department AK
RCA Laboratories
P.O. Box 432
Princeton, N.J. 08540

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RCA

TOPS-10 SYSTEMS PROGRAMMERS AND TECHNICAL LIAISON

Systems programmers for a large DECsystem-1090 at Monsanto Company in St. Louis, Mo. Two years of systems programming experience and a BS degree required. Experience with large software projects a plus.

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This person will support PDP-11 70's, 55's, 34's and PDP11/03's running RSX11-M, S and DECNET. One year of PDP-11 systems programming experience and a BS degree required.

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If you have the ability to provide technical direction to programmer analysts, we want to talk with you. Several positions are currently available in communications software development, software tools development and integration, and FORTRAN COMMON LIBRARY. BS in Computer Science and 3 years' programming related activities in these areas are required.

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Management Development. Participate in the design, implementation and maintenance on a variety of data management projects, including new features in the data description language and the data base access product. A working knowledge of block structured languages is required. Familiarity with an assembly language is highly desirable.

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If you have knowledge of compiler theory and construction and a working knowledge of assembly and higher level languges, we want to consider you for positions in our Common Code Generator, Common Library and BASIC and FORTRAN compiler projects.

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If you are an experienced O/S programmer, consider developing software for the STAR 100, one of the largest and most advanced virtual memory and string array processing computer systems in the industry today. Positions involve detailed design, implementation and documentation of new STAR O/5 features and improvements. A working knowledge of FORTRAN and an Assembly language are required.

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You will be involved in the performance analysis of compiler, data management and network products. Positions include performance test base development, test plan development and development of performance analysis tools for standard scientific software products.

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You will be involved in the design and implementation of software tools, the analysis of core dumps, the utilization of sophisticated troubleshooting techniques to identify causes of system failures, and enhancement of test library through development of new tests and procedures. O/S development or support experience, FORTRAN or COBOL, and assembly language (preferably COMPASS) is required.

Control Data offers a challenging and rewarding work environment and with us you will receive recognition and technical growth. We provide excellent compensation and comprehensive benefits, including dental and retirement plans. Qualified candidates are invited to send resumes, stating position of preference and salary history/requirements (only those resumes with salary history/requirements will be considered) to Karen Hardy, Dept. 50A, 215 Moffett Park Drive, Sunnyvale, CA 94086. (408) 734-7434.

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M.I.S. International, Inc., an international computer systems integration company, needs specialized professionals for Michigan, Ohio and Indiana branches.

- Business system analyst/programmers with experience in COBOL, PL/1, IMS, DMS!, IDS.
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Experienced men and women interested in furthering their career should consider M.I.S.'s top salary structure, stable employment environment, fully paid fringe benefits, educational opportunity and relocation allowances. You are invited to call or send your resume to Mr. Gene Bryant.

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This is an excellent opportunity to join a $300 million division of a Fortune "500" company that offers significant career advancement. We are seeking an individual with at least 3 to 5 years experience in Planning within the Data Communications or Data Processing fields. Responsibilities will include planning new strategies for new products/business on a division-wide basis.

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COBOL or IBM 370 ASSEMBLER experience required. Marketing Representative should be experienced in software packages sales. Send Resume to:

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North Carolina-$23,000 SR. SYSTEMS DEVELOPER

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International Paper Company has an immediate opening for a Teleprocessing Systems Programmer to work in our Southern Regional Computer Center in Mobile, Alabama.

We seek an individual with a minimum of two years experience as a Systems Programmer actively supporting CICS, VTAM and NCP on a large OS system. MVS experience would be helpful, but not a requirement. The primary duties will include supporting, VTAM, NCP, and TCS-AF.

Good salary, plus the usual range of large company benefits, including relocation expenses.

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Jerry T. Upchurch
Project Leader
Technical Development
INTERNATIONAL PAPER COMPANY
P.O. Box 160707
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Small midwest private high school has an opportunity for DP Manager. Presently operating a Basic Timesharing computer for business purposes, and an HP-3000 for academic, development, and business applications. Pleasant small town atmosphere. Educational and recreational privileges for you and your family. Contact Business Manager, Culver Military Academy, Culver, IN 46511 or phone (219) 842-3311, Ext. 220.

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As an integral part of a profitable DP organization, your skills contribute directly to our company objectives. Instead of serving in an overhead capacity in a user environment, your energies and talents are the main line of ISA's business. Accordingly, you will receive the top compensation due successful professionals.

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ISA's headquarters is located in the lovely, quiet, and traffic-free Peachtree Corners area of Northeast Atlanta. Your work facilities and even your flexible working hours reflect the fact that at ISA you are truly a professional.

ACT NOW!

With as little as 1 year of programming experience, and a strong dedication to success, you may owe it to yourself to explore this unique opportunity. For immediate consideration:

ISA
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PO BOX 47975, ATLANTA, GEORGIA 30362
INSURANCE SYSTEMS OF AMERICA INC

DATA PROCESSING OPPORTUNITIES

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Salary: Commensurate with experience: fringe benefits including medical and life insurance and retirement programs available: also opportunity to continue education part time.

Make application with: Office of Personnel Services,

Oklahoma State University
407 Whitehurst Hall
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PROGRAMMERS

Bendix has several outstanding career opportunities available for Programmers in support of NASA operations in Greenbelt and Columbia, Maryland.

SENIOR PROGRAMMER (Columbia. Md.)

Salary Range - $16,000-$23,000

Position requires a degree plus 5 years commercial applications and project areas experience utilizing:

- ANSI-COBOL for 370/155 (with OS knowledge)
- OS/MFT
- OS/VS
- JCL writing ability

You should be a self-starter with the total capacity of developing programs and job streams from prescribed systems specifications.

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Position requires scientific background in hardware/software anomalies utilizing JCL, APL & TSO on 360/370 computers. Real-time analysis requiring FORTRAN, BASIC DAP-16 or MODCOMP II Assembly.

If you meet the qualifications, please Call Collect, Professional Placement Office at (301) 730-3700, Ext. 273 or send resume INCLUDING salary history to:

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Subsidiary of The Bendix Corporation
9250 Route 108 Columbia, Md. 21045
ATTN: Professional Placement Office
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Chief Engineer/ Electronics

Needed: a state-of-the-art engineer with microprocessor applications, hardware and software development experience. A B.S.E.E. and management experience also required.

Outstanding compensation package. Send resume with salary history to:

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We offer excellent salary, complete company benefits, liberal relocation policy and an opportuni, to join a group of highly creative people in sunny South Florida. If you qualify call Miles Johnson collect at (305) 591-5212, or send you: resume in complete confidence to:

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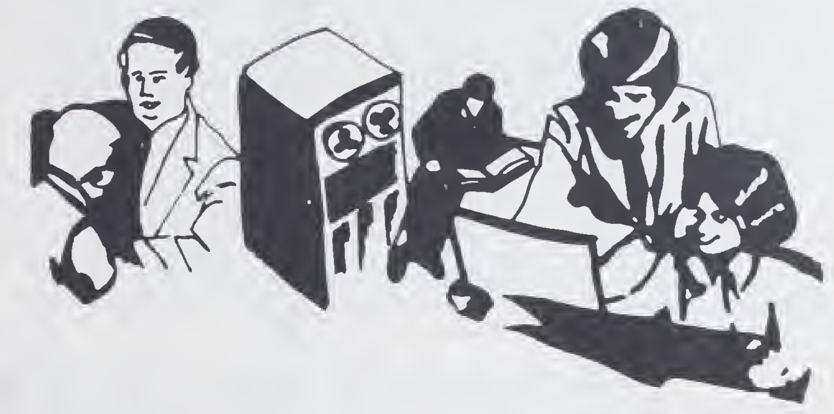
Data Communications Analysts/Programmers

If you have the potential to move up in management...



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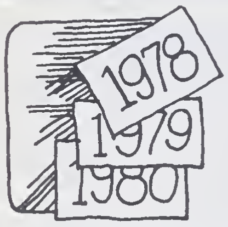

And In Two Years...?

You'll be interested to find out that we spend a long time talking to your future boss about the opening at his company and about the responsibilities now and then two years in the future. We intend to recommend a position to you that will satisfy your career objective. That's a Romac difference and the reason so many qualified professionals in EDP rely on us.

Call us now for outstanding career opportunities like these representative positions.

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Senior Systems Consultant...........	Atlanta	$23,500
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Contact your local Romac office in Atlanta, Boston, Buffalo, Charlotte, Hartford, New Haven, Philadelphia, Portland, Rhode Island, Rochester/Syracuse, Stamford, Wellesley Hills or write A L Lemay, President, 2 Sun Life Executive Park, Wellesley Hills, MA 02181

PROGRAMMER ANALYST

UPPER PENINSULA

We are a major independent natural resource mining company with a solid earnings growth record. Our business is iron ore mining and processing operations, Great Lakes Shipping as well as diversification in other natural resource and energy-related areas.

If you are a project-oriented data processing professional with 5 to 7 years in design and programming of business systems in an OS/VS-1, CICS, IBM 370 Series Installation we are interested in talking with you. We believe this challenging opportunity may be especially attractive to a shirt-sleeve professional interested in a professional yet informal work climate. An appropriate college degree is preferred but "hands on" know-how is the prime requisite. The successful candidate must be available for relocation.

We are offering an excellent salary plus bonus and a comprehensive company paid fringe benefit package. In addition, our Northern Michigan location offers the advantages of a small city environment and outdoor recreational opportunities to suit every interest.

Please call collect or send resume including salary requirements in confidence to: Employment Supervisor

The Cleveland-Cliffs Iron Co.
1460 Union Commerce Building
Cleveland, Ohio 44115
(216) 241-2356
Equal Opportunity Employer M/F

DATA PROCESSING PROFESSIONALS

Unusual Opportunities

Union National Bank, with over one billion dollars in assets, is seeking experienced individuals to fill positions created by growth in our Data Processing Division. These positions offer outstanding growth opportunities to the right enthusiastic and energetic candidates.

Systems Analyst

Openings for results oriented Systems Analysts with several years of banking background to help develop a long range data processing plan including the design of systems that will lead the industry. College degree or equivalent experience required with some background in operations research techniques helpful. Must have innovative mind, ability to work with upper levels of management and strong leadership skills.

Programmer Analyst

Several openings for talented individuals with COBOL and/or CICS experience to develop systems, lead major development efforts and install major banking/financial management information systems utilizing large-scale IBM hardware and software.

Send resume in confidence to:

THE UNION NATIONAL BANK OF PITTSBURGH
P.O. Box 837
Pittsburgh, PA 15230
Attn: A.W. Hogeland, Personnel Officer
Equal Opportunity Employer M/F

Data Processing
University of Illinois
Director of Administrative Information Systems & Services

The University of Illinois is looking for a Director for the Chicago Circle Campus Office of Administrative Information Systems and Services who is responsible for providing data processing service supporting the administration and operation of Circle Campus. These services include the development, maintenance and production of campus computer-based application systems.

To meet the challenges of this position, the Director should have a Bachelor's degree and a minimum of ten years experience in data processing including at least five years in a management capacity. Data processing experience in higher education and an advanced degree are highly desirable. Fringe benefits include four week vacation, paid legal holidays and an opportunity and to pursue graduate work toward an advanced degree at the University. Salary is commensurate with experience and ability. Deadline for all applications is September 22, 1978. Send resume including salary history:

J.A. Catrambone, University AISS-Rm. 370 RRB, University of Illinois, P.O. Box 4348, Chicago, IL. 60680. The University of Illinois is an Equal Opportunity Employer and encourages applications from women and minorities.

POLICE COMPUTER SYSTEMS
ANALYST SUPERVISOR
$20,842-28,104 Annually

Professional supervisory work responsible for coordinating assigned phases of data communications systems analysis projects, assuring that user applications and subsystems activities are compatible with total system objectives. Requires a B.S. in Mathematics, Computer Science or equivalent, plus three years of experience including two years supervisory experience in a real time data processing facility utilizing remote terminals. Some experience in a Public Safety on-line telecommunications setting also required. Must meet polygraph and background standards, appropriate to the Police Department. Contact: City of Phoenix, Personnel Department, 10 North Third Avenue, Phoenix, Arizona 85003. AN EQUAL OPPORTUNITY M/F AFFIRMATIVE ACTION EMPLOYER.

Cornell University

Located in the beautiful Finger Lakes Region of New York State, which offers attactive recreational and cultural opportunities in a small-city environment free from overcrowding and pollution, is seeking applications from qualified professionals for six management and technical staff positions in the development and support of new users and applications in physical and social science computation, medical research, APL applications, instructional applications, and technical writing. Each of these positions requires a degree and a record of accomplishment in the particular area, with experience in a not-for-profit environment desirable. All positions offer a competitive salary and outstanding fringe benefits, including excellent retirement and educational opportunities.

As an equal opportunity/affirmative action employer, Cornell particularly encourages applications from qualified women and minorities. Resumes including salary history and requirements should be sent in confidence to: Dr. Douglas E. VanHouweling, Associate Director of Computer Services, G-26 Uris Hall, Cornell Univeristy, Ithaca, New York 14853.

PROGRAMMER/ ANALYST

An important subsidiary of a leading toy manufacturer, seeks a qualified programmer/analyst for this rewarding position. You will report directly to the Manager-MIS and be responsible for analysis, programming, testing, implementation, and documentation for a variety of assignments.

The successful candidate must have some background in teleprocessing and project documentation, and a minimum of 3 years Systems/3 programming with RPG II.

We offer an excellent starting salary, opportunity for career growth, and comprehensive benefits.

Qualified applicants are invited to send resumes to:

CW Box 1663
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DATA PROCESSING MANAGER

THE OPPORTUNITY

To assume immediate responsibility for directing the activities of an aggressive, nine-person DP team.

THE COMPANY

JLG Industries, Inc., leading manufacturer of aerial mobile platform lifts and industrial cranes and a public company trading OTC.

THE LOCATION

Small town suburban south central Pennsylvania area within 45 minutes drive from Hagerstown, MD.

THE POSITION REQUIREMENTS

Experience in using IBM System 3/15D equipment with disk input and storage. Working knowledge of RPG-II required; FORTRAN would be a plus. Data collection through on-line terminals desirable.

Good track record as a Supervisor or Manager, preferably in a manufacturing environment.

In-depth familiarity with Standard Costs, Inventory Control, MRP, Accounts Receivable, Accounts Payable, General Ledger and Financial Reports.

THE "PLUS" FACTORS

New, modern equipment and facilities.
Liberal, extensive employee benefits package.
Excellent long range growth potential.

Qualified applicants are requested to submit complete resume of training and experience background, including current financial requirements, to: Sam Swope, Personnel Department.

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PROGRAMMING MANAGER

New York City

FTC Communications, Inc., a rapidly expanding International Record Carrier is looking for a software leader. Current position requires 5 to 7 years of experience preferably in financial and real time applications. In-depth knowledge of PDP 11 Macro Assembler and RSX-11M operating system is required. We offer good career opportunities in a challenging environment. Please send resume and salary history to:

Director of Operations
FTCC
25 Broad Street
New York, N.Y. 10004
An Equal Opportunity Employer

DATA PROCESSING PROFESSIONALS

Outstanding opportunities for motivated and highly skilled individuals who wish to be part of a new systems development team. Our company is a proven leader in the Fast Food Industry in the design and use of teleprocessing, Point-of-Sale, and On-Line applications. Positions now open include:

SENIOR SYSTEMS ANALYST

A self-starter with at least 3 years experience in all aspects of systems design and development. Working knowledge of COBOL and experience in design of On-Line applications required. Knowledge of DL/1 data base design a plus.

SENIOR PROGRAMMER

At least 2 years of CICS experience with 5 or more years of solid ANS COBOL with IBM 370 CPU's. Experience with applications using DL/1 is desirable.

SENIOR SOFTWARE PROGRAMMER

At least 3 years systems programming experience with a comprehensive knowledge of operating systems, and teleprocessing systems and equipment in 370 DOS/VS and CICS environment. Knowledge of DL/1 a plus.

We offer excellent benefits and competitive salaries based on experience and other qualifications. Our medium size shop is located in a modern office complex offering an excellent working environment. Please send resume detailing salary history and requirements to:

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CIRCULATION DEPARTMENT

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Positions are currently available in:

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(201) 444-9800

ATARI

We're the Company that puts more fun in your life as front runners in the video game industry!

SAN FRANCISCO PENINSULA

We have just completed a 77,000 sq. ft. fully carpeted and air-conditioned facility that is totally dedicated to design and engineering. Included is a cafeteria, two documentation facilities, three dark rooms, and a complete wood and metal shop to bring creations from the concept stages through the working prototype. We have immediate openings in:

COIN-OP DIVISION

MICROPROGRAMMERS

Individuals will participate in the programming and design of video, pinball and electromechanical coin operated games. 2-5 yrs. programming experience in mini/micro computer programming at assembly language level. Hardware experience and knowledge preferred. BSEE/CS or equiv.

CONSUMER DIVISION

MICROPROGRAMMERS

You will work in R&D environment to create programs and checkout video games using the following: RT 11 on LSI 11 with editor and cross assembler and MOS technology 6502 development system and logic analyzer. 1-8 yrs. assembly language on mini/micro computers with I/O and interrupt experience; Hardware experience desired. BSEE/CS or equiv.

ATARI offers an outstanding work environment in the Moffett Industrial Park. Our benefits are exceptional and include Company Paid Employee Life/Health/Disability/Dental Insurance, plus a Sabbatical leave policy which offers 7 weeks paid leave of absence after 7 years of continuous service with ATARI, generous relocation benefits and much more!

Please send your resume, with salary history, to Professional Employment (Dept. MP), ATARI, Inc., P.O. Box 9027, 1265 Borregas Ave., Sunnyvale, CA 94086. We are an equal opportunity employer.

ATARI

WE TAKE FUN SERIOUSLY

EDP SOFTWARE/HARDWARE
PROFESSIONALS

NCR/San Diego is making the big moves.

We have room for professionals with ideas that are big enough to spawn new divisions.

THINK BIG aptly describes the way we develop and implement new concepts at this pace-setting NCR facility. We design and build large-scale computer systems — with a difference. Our bold thinking pushes the state-of-the-art to anticipate the EDP needs of business in the 1980s. That boldness leads to the kind of major developments that have twice warranted setting up company divisions for new products.

Where we're headed...

We have several major projects in work. One is our new virtual resource executive — a powerful system that combines COBOL with virtual operation. Another is a system which will provide interactive transaction processing capability for our virtual mainframes. And in the design process, we're looking for new approaches to SW/FW/TW development. On top of that, we're moving rapidly into VLSI technology with the support of NCR's own microelectronics facilities.

We're big on resources...

You need lots of high calibre equipment and technical support to take on projects of the magnitude we handle. You'll be working with our most powerful, new generation Criterion mainframes, the latest advances from our data communications divisions, a highly interactive battery of technical support specialists. And you'll have it all at hand in a plant-complex big enough to house your grandest ideas.

...but small in modus operandi

We keep our project teams small. You work intimately with a few heavyweight professionals. That means, you come to grips with more of the problem, share more of the responsibility. It also means that everyone carries his or her full weight and stands out with high visibility.

Outside — the good California life...

Our pioneering development groups are at home in Rancho Bernardo, 22 miles up the coast from San Diego. Our 114-acre hilltop location has been called "one of the 10 best-designed facilities in the nation." You'll be in the midst of California's finest recreational facilities, including 70 miles of beaches from San Juan Capistrano to the Mexican border. You'll work where others come to vacation.

* * *

WHAT'S NEW AT NCR?

NCR is on the move. We've mounted a major, coordinated effort, backed by ample R&D resources, to emerge up front in 1980s EDP. For example: VLSI technology, distributed network architecture with interactive transaction processing and important new functions, machine-independent DLC and I/O protocols, high-level PASCAL-based OS language, powerful new virtual systems, and advanced concepts in MPU-based terminals.

Immediate Openings — Hardware areas:

- Design Automation Engineering
- MICR/OCR/OMR Engineering
- Memory Device Engineering
- Logic Design Engineering
- Systems Architecture
- I/O Subsystem Configuration
- Systems Integration Test
- Product Engineering— Mechanical, Optical, Electrical

Immediate openings in many areas

If you have an engineering or computer science degree (or equivalent) and a year or more of experience in one or more of the areas listed, contact us at once.

Immediate Openings — Software areas:

- Distributed Network Architecture
- Transaction Processing
- Interactive Processing
- Data Base Design
- Performance Measurement & Analysis
- Configuration Management
- File Access Methods
- Operating System Development
- Compiler Design/Development
- Firmware Development
- Diagnostic Programming
- Test Systems Development
- MICR Proof Of Deposit Software
- Systems Architecture

Mr. George Rice, Manager,
Professional Placement Engineering
and Manufacturing, Dept. A 50,
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NCR

Complete Computer Systems

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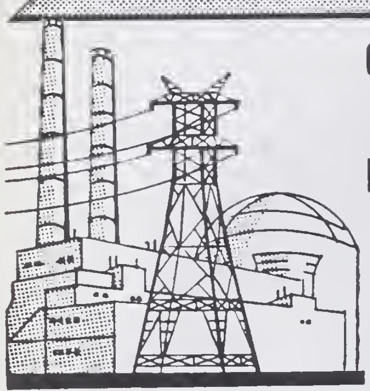

OPPORTUNITIES FOR COMPUTER PROFESSIONALS IN BUSINESS COMPUTER APPLICATIONS:

ANALYST PROGRAMMERS

We have openings for experienced individuals who have a proven track record in large applications systems using advanced IBM 370 hardware and software technology. If you desire to help us ready for the 1980's, if you produce quality systems on time, within budget, within specifications, you may like the challenges.

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We need an experienced person in business methods and procedures to assume a responsible position in our Management Information Systems Group. Responsibilities will include Methods, Procedure Writing, and Field Training. Applicants should have five or more years of experience in methods work and procedure writing for computerized businesss systems. A proven leadership record with verbal and written communication skills in a demanding environment is essential.

Please apply in writing with educational, employment and salary requirements to:

Mrs. Linda M. Heidenis
P.O. Box 270, Hartford, CT 06101
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NORTHEAST UTILITIES

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The Conn. Light & Power Co.
The Hartford Electric Light Co.
Western Mass. Electric Co.
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Northeast Utilities Service Co.
Northeast Nuclear Energy Co.

PROGRAMMER ANALYSTS

A-large NYC medical center expanding into on-line systems has opportunities for Programmers with a minimum of 3 years' experience utilizing COBOL under DOS/VS and interest in working with users. Good communication skills required. Opportunity for total project responsibility.

Excellent benefit package including 4 weeks paid vacation, free health, drug and dental coverage plus free tuition at N.Y.U.

Interested candidates should submit resume, with salary history and requirements, to: Mr. James Campbell, Personnel Department.

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DATA PROCESSING CAREERS

Milwaukee based fortune 400 manufacturer needs experienced expertise in the following areas:

Long Range Systems Planner

Your 8 to 10 years in EDP should have given you a wide range of exposure to different business applications, or even consulting work. Responsibilities include assisting business groups and the corporate service organization to develop their individual information systems plans, by defining sysems and data bases required to produce information for management planning and decision making.

Systems specialists in the following functional areas are needed:

- Market Planning and Support
- Order Entry/Processing
- Accounting and Financial Management
- Personnel Information
- Technical Services
- Manufacturing
- Interoffice communication

Corporate Data Planner

Your 6 to 8 years in EDP should have given you a thorough knowledge of data base concepts and practices. Responsibilities include developing and publishing data base strategy and policies for the entire corporation, in terms of geographical data location, data grouping, data relationships, data element definition, and data administration procedures. The incumbent will also provide coordination to all data centers.

Systems Analysts - IBM 370

Your 2 years of programming and 1 to 2 years of system analysis should have given you exposure to a broad range of applications in a manufacturing environment. You should be user oriented and possess good written and oral communication skills This position is a good springboard to a management position.

If you desire a challenge and an exciting future, submit your resume in strict confidence with salary history to:

Lee A. Junkans
CUTLER-HAMMER, INC.
4201 North 27th St.
Milwaukee, WI 53216
An Equal Opportunity Employer M/F

ANALYST/PROGRAMMER

(Denver, Colo. Area)

Jefferson County School District is seeking a qualified Analyst/Programmer with a minimum of three years of progressively more responsible experience in analysis, design, programming and maintenance of computer financial application software systems using COBOL. Applicants must have worked the governmental/encumbrance financial systems including purchasing and inventory systems and have completed a college degree in Computer Science, or Business, or have equivalent work experience. Preference will be given to applicants with MSA software Implementation experience. Additional experience with DOS/VS, CICS/VS and/or ADABAS is desirable. Starting Salary Range: $1300 to $1500 per month. Qualified applicants should send resumes to:

Mr. Shunsaku Sugiura
Jefferson County Schools
Computer Services Department
13300 W. Ellsworth Ave.
Golden, CO 80401
An Equal Opportunity Employer

Programmer Analyst II

City of Fort Collins, Colo. University City (population 72,000) located 65 miles north of Denver in foot hills of Rocky Mountains.

Salary range $15,730 to $21,034 depending on qualifications. Responsible for developing new systems and modifying existing systems. Requires BS in Data Processing or related field plus experience using COBOL and 4 years experience in Systems and Programming with at least one year as LEAD analyst. Equivalent combination of education and experience acceptable. Experience with UNIVAC 90/30 OS-3 desirable.

Apply to personnel office, P.O. Box 580, Fort Collins. Colo. 80522 by Monday, August 31, 1978. Includes salary requirements.
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HORIZON
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ANALYST/ PROGRAMMERS

For career enhancement, contact
LES SMITH, CDP
A data processing professional

Our sunbelt and nationwide companies are seeking: Software Development and Systems Programmers Manufacturing, Financial & Scientific IBM, Honeywell, DEC, Burroughs, NCR. All experience levels, $15,000 to $25,000, all fees paid. Send resumes in confidence or call collect.

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615/383-1466

DIRECTOR, COLLEGE COMPUTING SERVICES LAMBUTH COLLEGE JACKSON, TN

Requires individual with ability to manage school's computer center and coordinate management information systems activities partially funded under federal "Advanced Institution Development Grant." College recently purchased IBM System/3 Model 15 computer system to strengthen the areas of development, student records and accounting.

Qualifications - Management or related degree (prefer Master's level), at least two years management/systems experience (prefer in educational environment), and familiarity with IBM System/3 configuration. Salary negotiable based on qualifications. Apply immediately to: Dr. David S. DuBose, Lambuth College, Jackson, TN 38301; telephone, (901) 422-5870. An Affirmative Action/Equal Opportunity Employer.

CINCINNATI

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or send resumes, areas desired and current salary to
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SYSTEMS PROGRAMMER

Immediate need due to expanding workload. Have 370/148 with remote 3270's moving to ACF/VTAM-NCP-3278's and a 303x. Must have experience to assume OS/VS1 SYSGEN and maintenance responsibility and provide technical COBOL and JCL support immediately. You would be trained to assume other duties. Additional experience in VM, OS/CICS, VTAM, VSAM, CRJE, IMS/DB, SNA, ATMS and Fortran would be helpful. Send resume, salary history and expectations in complete confidence to:

Employment Supervisor
Iowa-Illinois Gas and Electric Company
P.O. Box 4350
Davenport, Iowa 52808

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APPLICATION PROGRAMMERS

Cody, Wyoming

The challenges of a dynamic company; the excitement of the oil industry; and the natural grandeur of the Rocky Mountains! All of these are enjoyed by employees of Husky Oil Company.

We're a fully integrated, independent oil company with career opportunities in our Cody, Wyoming, offices for Application Programmers with 2-5 years experience and OS/VS or related IBM backgrounds.

If you are a COBOL programmer and would like to live in an environment where you'll enjoy a casual lifestyle and plenty of old fashioned friendliness, please send your resume and salary history to us.

Our offer includes a competitive salary and benefits package, plus rewards for your efforts.

C. Ed Hall
Manager, Employee Relations

Husky Oil Company
PO Box 380
Cody, Wyoming 82414

Husky

Equal Opportunity Employer M/F

PROGRAMMER/ANALYST

Excellent opportunity for experienced Programmer/Analyst to join our headquarters Information Systems Department.

THE COMPANY...

Founded in 1905, we are a growth oriented, financially related subsidiary of the St. Paul Companies, engaged in consumer credit activities on a national scale from our Sioux City based headquarters.

THE POSITION...

You will be heavily involved in new project development providing systems support for all divisions and subsidiary operations of the company. You will direct the evolution of new systems from first idea to finished product, on an IBM 370 DOS/VS operating system.

THE INDIVIDUAL...

As a successful candidate, you will have 4-6 years DP experience on a 360/370 environment with COBOL primary and RPG or BAL secondary. IBM JCL/Utilities experience is required. A degree in computer science, accounting, math or other related areas is desired, but may be offset by experience.

THE REWARDS...

If you meet our requirements and the challenge, we offer a career opportunity with commensurate compensation and full benefits. All interview and relocation expenses are paid.

For prompt consideration, send your resume in confidence, with earnings history, to:

Manager of Personnel Services
Postal Finance Company
814 Pierce St.
Sioux City, Iowa 51102

An Equal Opportunity Employer M/F

data processing

Regional Systems Engineer

As one of the most exciting and successful companies in the computer industry, Amdahl Corporation's worldwide installed base of 470 series systems is rapidly expanding. As a result, technical opportunities currently exist in major metropolitan areas around the country. At Amdahl you'll find professional freedom, room for advancement, and the kind of enthusiasm and spirit of the challenge that has characterized the company since we began.

You are a well seasoned large-scale systems programmer, or have vendor experience as a large-scale systems engineer, with experience in or aptitude for marketing support. You will perform survey and analysis work at prospective installations, provide technical assistance in proposal generation, and participate in marketing presentations. You also will be a strategy advisor to field systems engineers, make field support recommendations to headquarters, and bring your talent to bear on the more elusive software problems.

Your background must include internals level experience with MVS, SVS, or VM. Opportunities currently exist in many major metropolitan areas around the country including:

NEW YORK
LOS ANGELES
DETROIT
WASHINGTON, D.C.
CHICAGO
HOUSTON
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Qualified candidates are invited to write or call the Amdahl office nearest them.

Buddy Taylor
Amdahl Corporation
5454 Wisconsin Avenue
Suite 825
Washington, D.C. 20015
301/657-8200

Phil Beckhelm
Amdahl Corporation
1250 East Arques Avenue
Sunnyvale, CA 94086
408/746-6165

Bob Fields
Amdahl Corporation
Oak Brook Regency Towers
1415 W. 22nd Street, Suite 390
Oak Brook, IL 60521
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amdahl

VALLEY NATIONAL BANK

At Valley National Bank we have a sense of pride in our growth and our state. This sense of pride is carried on in the work our 5000+ employees do for us. Our growth is measured by the success of the people who are Valley National Bank . . . our employees. If you qualify in the following areas . . .

* INVESTMENT SYSTEMS ANALYST

Distributed processing, real time system. Prefer investment systems experience including cash management, trading, portfolio. Minimum 2 years programming experience required. FORTRAN & ALC preferred. Need strong communication skills.

IBM 370/158 & 168, OS/VS COBOL &/or ALC

*LENDING SYSTEMS PROGRAMMERS/ANALYSTS

3-5 years programming experience preferred with banking applications experience: Inst. Loans, R/E, Com'l Loans, DDA, TDA, Charge Card (M/C &/or Visa preferred).

. . . and would like to become part of our success then send your resume and salary history to:

VALLEY NATIONAL BANK
P.O. Box 71 CW3 B301
Phoenix, Arizona 85004

An Equal Opportunity Employer M/F

VALLEY NATIONAL BANK

SOFTWARE ENGINEERS

The Boeing Company in Seattle, Washington offers a variety of challenging software engineering career opportunities in support of a wide range of projects including:

Energy Management/Control Systems
Military Command/Control Systems
Military & Space Avionics Systems
Surface Transportation Systems

Call us toll free on Monday. Our software engineering manager will be standing by to discuss the opportunities available to you if you have U.S. citizenship, a B.S. degree in engineering or computer science and an interest in the following:

OPERATIONAL SOFTWARE DEVELOPMENT

Design and develop software for simulators, operational systems, automatic test equipment and other special-purpose or realtime applications.

SOFTWARE/COMPUTING SYSTEM DESIGN AND ANALYSIS

Analyze system hardware, software and operator requirements to support establishment of a system architecture. Perform systems analyses and trade studies to support design concepts, new business acquisition and proposal activities.

SOFTWARE AND COMPUTER SYSTEM TEST AND EVALUATION

Design and develop hardware and software test concepts and environments to support operational software and computer systems test. Conduct software tests.

CALL LEONARD NELSON TOLL FREE MONDAY THROUGH FRIDAY AT 1-800-426-8350, ask for "Employment Extension 773-2831" between 9 a.m. and 4 p.m. Pacific Daylight Time. Or, send your résumé to The Boeing Company, P.O. Box 3707-LPM, Seattle, WA 98124.

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BOEING
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PROGRAMMER/ANALYST POSITIONS

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Senior Systems Analyst, minimum 5 yrs experience in design and implementation. Ideal candidate will have 2 yrs experience in teleprocessing (CICS or equivalent) as well as 3 yrs COBOL experience; DOS, OS important extra.

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Send resumes, including salary history, in confidence to SJIS Project Office, NCJCJ Project, 70 South Main St., Providence, RI 02903. Closing date is Sept. 15, 1978.

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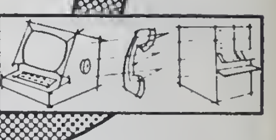

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This department is engaged in the development of software for on-line interactive data processing systems. Software product area currently under development or planned for the near future include both development of support systems and real-time operating systems. We seek people with design implementation and support of compilers, assemblers, link editors, object processors, automated software distribution and control libraries. Openings also exist for individuals with design implementation of real-time communications-oriented multitasking operating software for microcomputers or equivalent.

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This area provides early definition and design of future microcomputers in communications products along with initiation, early program management, and startup development of new programs. This group offers opportunities for individual contributions in a systems level scope of design from the conceptual stage to finished product. We require senior analysts with a minimum of 5 years in software plus knowledge of hardware in any one of the following areas: • Microcomputer Design • Communications Product Design • Communications Network Architecture • Systems Modeling Performance Measurement and Analysis.

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For immediate consideration, please send resume and salary history to: Mr. Ken Uhlig, Engineering and Manufacturing, Dept. A50, NCR Corporation, 3325 Platt Springs Rd., West Columbia, S.C. 29169. Or, call him, Toll Free, at 1 (800) 845-0586.

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Must have 2-4 years experience in A/P, G/L, financial reporting, payroll and personnel reporting, and management information systems. Preferred candidate will have 2-4 years COBOL programmingnd a background in systems design methodology and project control. Experience with IBM 370 OS/VS, CICS and DL-1 helpful.

Starting salary is excellent and full ranging benefits include generous relocation and assistance to our client's headquarters city in Western Pennsylvania. This pleasant, pollution-free community combines major metropolitan attractiveness with the warmth, friendliness and low pressure of a small hometown. For immediate consideration, send resume with salary history to:

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Boston Edison Company is seeking Systems Analysts

You must have a college degree, with at least 3-5 years experience in Systems work with BAL (Basic Assembly Language) programming expertise. COBOL Data Communications and IMS (Information Management System) experience preferable.

Please send your resume and salary requirements, in confidence, to John R. Currie, Boston Edison Company, 800 Boylston Street, Boston, MA 02199.

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RARE OPPORTUNITY

Scientific Programming Group available en masse due to imminent Engineers' strike at McDonnell Douglas Corporation. First-rate experienced people.

Contact: F.N. Workman
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Professional
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3711 Long Beach Blvd., Suite 422
Long Beach, Calif. 90807

ENGINEER

The Ames Laboratory of the U.S. Department of Energy has an opening for an Engineer in its Solar Energy Division for technical review and analysis of commercial solar demonstration projects. Duties would include computer modeling, performance evaluation, cost estimating and economic analysis of projects. Also would prepare special studies and proposals for unique problems encountered in project reviews and in investigative work conducted at Ames Laboratory.

Qualifications required are M.S. in Engineering or the equivalent with from 5-8 years experience in HVAC. Must have enough training in computer science to do modeling, code changes, evaluations and analysis of systems. Need good oral and written communication skills.

Interested parties should submit complete resume along with the names of 3 professional references to: Ames Laboratory, Personnel Office, 127 Spedding Hall, Iowa State University, Ames, Iowa 50011.

Application deadline: September 22, 1978 or until filled.
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Responsible for the effective operation of our CICS/TOTAL or IMS DB/DC system including program product recommendation and installation, testing and troubleshooting as well as modifying systems to meet user requirements. Computer Science degree or equivalent coupled with indepth knowledge of CICS or IMS intervals plus proficiency in ASSEMBLER and COBOL essential. A systems programming background and a knowledge of telecommunications is helpful.

mvs-jes systems development

Responsible for maintaining and implementing control software systems. Also includes evaluation of new functional capabilities as well as indepth technical support for the center's staff. Computer Science degree or equivalent coupled with indepth knowledge of MVS-JES-2 essential.

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Responsible for maintaining the effective utilization of our resources through computer performance evaluation and capacity management. Hardware and software monitors are at your disposal with analytical skills in their use helpful. Computer Science degree or equivalent coupled with a solid background in both hardware and software.

As a member of our data center located in a medium-sized midwest city, you'll receive an excellent salary & benefits package as well as exciting opportunities for career development and growth. Forward a letter or resume in confidence to Mr. Dave Thomas, FMC CORPORATION, 200 E. Randolph Drive, Chicago, Illinois 60601. We are an Equal Opportunity Employer M/F.

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A rocky Mountain bank holding company is seeking a Data Services Manager. Individual will be responsible for holding company and affiliated bank processing through a remote service bureau and an in-house IBM System/3. Additional responsibilities will include the research of future system needs and managing system implementation effort at parent and affiliate banks. Previous management experience required. Salary commensurate with experience. Submit resumes and salary history in confidence to D.P. Resumes, P.O. Box 2545, Denver, Colorado, 80290.

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Responsibilities will include:

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- Ability to read engineering drawings.
- Systems design/mathematical background

These openings are for interactive graphics applications in the areas of:

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Gerber Scientific, a leader in interactive graphics, has recently established a Systems Division to focus on the continuing success and growth of this activity. The Systems Division has established an ambitious program for software enhancement. These positions represent key team openings offering excellent renumeration, fringe benefits, desirable living environment for you and your family and professional working environment.

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SYSTEMS AND PROGRAMMING PROFESSIONALS

American Fletcher Corporation of Indianapolis, Indiana, is now in the process of expanding its data processing operation.

American Fletcher National Bank, Indiana's largest bank, is the principal subsidiary of this one-bank holding company. Total assets of the Corporation are well in excess of $2 billion.

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American Fletcher offers the opportunity to:

1. Be a major contributor to the future growth of the Corporation.
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We are looking for programmers and programmer/analysts. We prefer applicants with two or more years programming experience in an IBM 145 environment and above, using OS to MVS software systems and languages of COBOL, ALC, or PL-1. On-line CICS experience is desirable.

If you are interested in pursuing a career at American Fletcher, we invite you to investigate the possibility of a match between your experinece and our current needs.

For consideration, call collect during business hours at (317) 633-2218 or send us your resume including salary history. All resumes will be held in strict confidence.

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Positions require 2-6 years' total EDP experience with meaningful background in two or more of the following:

- **(1) Systems development methodology**
- **(2) Automated documentation generators**
- **(3) TDDD & IPT's**
- **(4) Internal consulting (with user & technical personnel)**
- **(5) Data-base inquiry facilities**
- **(6) Regression testing methodology**
- **(7) Software evaluations**
- **(8) EDP Standards and systems assurance**

These positions are in a creative, innovative atmosphere and require the following — excellent communication skills, COBOL (shop language), PL/1 and/or MK-IV, TSO and/or Superwylbur

Systems Programmers

Positions require 3 years' Systems Programming experience, strong ALC skills, and a good understanding of MVS and systems 370 concepts. Experience in MVS internals, SMP, measurement and tuning, dump analysis, design and implementation of system software highly desirable.

TP Systems Programmer

Position requires 3 years' Systems Programming experience with primary emphasis on teleprocessing and systems. ALC and analytical skills, and a good understanding of MVS and System 370 concepts. Experience in teleprocessing, access methods (BTAM, VTAM), 3705 software, IMS, INTERCOMM, dump analysis, and design and implementation of system software highly desirable.

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If you are interested in pursuing a career in a progressive environment where your talents will be recognized and utilized, please call collect (415) 485-6096 weekdays, 8 AM to 5 PM Pacific Daylight Time, or send your application and salary requirements to Jose Garay, Employment Representative, **Dept. CW-4** 1600 Los Gamos Drive, San Rafael, California 94911 We offer excellent benefits and a generous relocation policy.

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We're not looking for people to join us and reproduce what they've done for someone else. That's not design or development. We want software specialists who are ready to pump out new ideas and take a chance on making a real contribution to the state of the art. If you like to produce rather than reproduce ...

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Forward resume, including salary requirements to Jack Kelly at the address below.

DRC

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* IMS/VS Performance Monitoring & Operations Support
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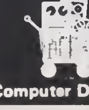

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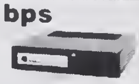
7200 bps 	**MODEM 4800/72** Dedicated line with optional multiport operation for up to three 2400 bps channels.	$6900 $165/mo.*	**$1995** **$80/mo.**
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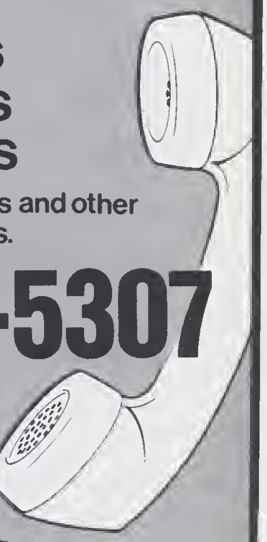

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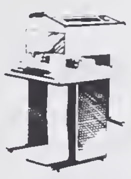

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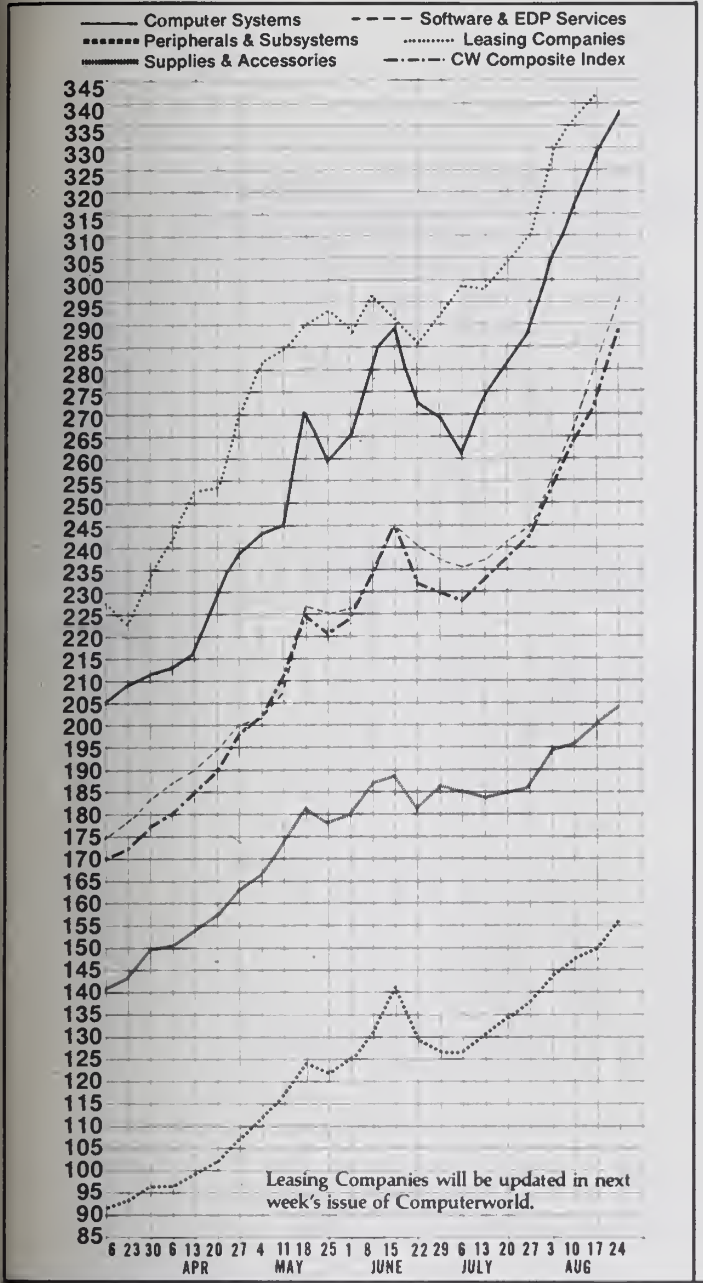

Leasing Companies will be updated in next week's issue of Computerworld.

Earnings Reports

BURROUGHS

Three Months Ended June 30

	1978	1977
Shr Ernd	$1.41	$1.23
Revenue	593,734,000	514,822,000
Earnings	57,463,000	49,545,000
Revenue	1,098,719,000	957,426,000
Earnings	90,950,000	77,934,000

DATAPRODUCTS

Three Months Ended June 24

	1978	1977
Shr Ernd	$.51	$.44
Revenue	38,137,000	30,011,000
Earnings	3,900,000	3,319,000

DATA RESOURCES

Three Months Ended June 30

	1978	1977
Shr Ernd	$.60	$.46
Revenue	7,972,200	5,605,200
Earnings	814,200	615,900
6 Mo Shr	1.11	.83
Revenue	15,045,300	11,109,600
Earnings	1,506,100	1,118,300

IBM

Three Months Ended June 30

	1978 (000)	1977 (000)
Shr Ernd	$4.73	$4.44
Revenue	4,921,337	4,419,071
Earnings	691,239	658,330
6 Mo Shr	8.74	8.26
Revenue	9,353,215	8,509,366
Earnings	1,280,255	1,231,673

NCR

Three Months Ended June 30

	1978	a1977
Shr Ernd	$5.46	$1.20
bRevenue	614,030,000	575,526,000
Earnings	158,201,000	33,879,000
6 Mo Shr	6.29	1.80
bRevenue	1,119,197,000	1,039,901,000
Earnings	181,070,000	49,959,000

a-Restated. b-From continuing operations.

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TRADE QUOTES

Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, AUGUST 23, 1978

All statistics compiled, computed and formatted by
TRADE QUOTES, INC.
Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		PRICE 1978 RANGE (1)	CLOSE AUG 23 1978	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMDAHL CORP	28- 56	55	+8	+17.0
N	BURROUGHS CORP	59- 85	83 1/4	-1 3/4	-2.0
O	COMPUTER AUTOMATION	23- 44	40 3/4	-2	-4.6
N	CONTROL DATA CORP	23- 42	41 1/4	- 1/4	-0.6
O	CRAY RESEARCH INC	21- 58	56 1/2	- 1/2	-0.8
N	DATA GENERAL CORP	42- 68	64 1/2	+ 1/4	+0.3
N	DATAPOINT CORP	34- 70	70	+ 3/4	+1.0
N	DIGITAL EQUIPMENT	39- 54	50 7/8	+1 3/8	+2.7
N	ELECTRONIC ASSOC.	2- 9	8 3/4	+1 1/2	+20.6
A	ELECTRONIC ENGINEER.	11- 19	12 3/4	- 5/8	-4.6
O	FOUR-PHASE SYSTEMS	19- 40	39 1/2	+ 1/4	+0.6
N	FOXBORO	28- 40	38 1/2	- 7/8	-2.2
O	GENERAL AUTOMATION	7- 26	25	+ 1/2	+2.0
O	GRI COMPUTER CORP	1- 2	1 5/8	- 1/8	-7.1
N	HEWLETT-PACKARD CO	62- 90	87	+ 1/8	+0.1
N	HONEYWELL INC	43- 72	70 3/8	-1	-1.4
N	IBM	236-298	297 3/4	+1	+0.3
O	MANAGEMENT ASSIST	9- 24	23 1/8	- 1/2	-2.1
O	MICRODATA CORP	10- 22	21 1/4	+ 3/8	+1.7
O	MINI-COMPUTER SYST	5- 8	6 1/2	+ 1/4	+4.0
O	MODULAR COMPUTER SYS	7- 15	15 3/8	+1 1/8	+7.8
N	NCR	37- 66	65 7/8	+1 7/8	+2.9
N	PRIME COMPUTER INC	20- 39	35 7/8	+4 3/8	+13.8
N	PERKIN-ELMER	17- 28	27 1/4	+ 1/4	+0.9
N	RAYTHEON CO	29- 58	54 3/4	- 3/8	-0.6
N	SPERRY RAND	33- 49	47 7/8	-1 1/8	-2.2
A	SYSTEMS ENG. LABS	11- 22	21 3/4	+2 5/8	+13.7
A	WANG LABS.	12- 32	32 1/4	+2 1/4	+7.5

LEASING COMPANIES

EXCH		PRICE 1978 RANGE (1)	CLOSE AUG 23 1978	WEEK NET CHNGE	WEEK PCT CHNGE
O	ALANTHUS CORP	3- 6	5 7/8	0	0.0
O	BOOTHE COURIER CORP	13- 18	16 1/2	+ 1/4	+1.5
O	COMDISCO INC	5- 17	16 3/4	+ 1/2	+3.0
A	COMMERCE GROUP CORP	1- 1	5/8	0	0.0
A	COMPUTER INVSTRS GRP	1- 5	5	+4	+400.0
M	DATRONIC RENTAL	1- 2	1 3/8	0	0.0
A	DCL INC	3- 4	4 1/8	- 1/8	-2.9
N	DPF INC	8- 14	13 1/8	+ 1/2	+3.9
N	ITEL	16- 33	33 1/8	- 1/4	-0.7
N	LEASCO CORP	24- 36	35 3/8	- 1/8	-0.3
O	LEASPAC CORP	1- 4	3 3/8	0	0.0
A	PIONEER TEX CORP	5- 7	6	+ 3/8	+6.6
N	U.S. LEASING	13- 20	19 7/8	+ 1/2	+2.5

SOFTWARE & EDP SERVICES

EXCH		PRICE 1978 RANGE (1)	CLOSE AUG 23 1978	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	1- 2	1 1/4	+ 1/8	+11.1
O	ANACOMP INC	8- 22	21 1/4	+ 3/8	+1.7
A	APPLIED DATA RES.	8- 17	16 1/2	+ 1/4	+1.5
N	AUTOMATIC DATA PROC	24- 36	34 1/8	- 3/4	-2.1
O	COLEMAN AMERICAN COS	1- 2	1 3/4	0	0.0
O	COMPU-SERV NETWORK	7- 12	8	+ 1/4	+3.2
O	COMPUTER HORIZONS	1- 8	8 1/4	0	0.0
O	COMPUTER NETWORK	8- 15	14 1/2	+1 5/8	+12.6
N	COMPUTER SCIENCES	8- 17	16 3/4	+1 1/4	+8.0
O	COMPUTER TASK GROUP	1- 4	3	0	0.0
O	COMPUTER USAGE	2- 4	3 5/8	+ 1/2	+16.0
O	COMSHARE	6- 19	18 3/4	+ 1/2	+2.7
O	DATA DIMENSIONS INC	4- 9	8 1/8	+ 3/4	+10.1
O	DATATAB	1- 2	1 3/8	+ 3/8	+37.5
N	ELECTRONIC DATA SYS.	15- 23	22 1/8	+ 1/2	+2.3
O	INSYTE CORP	1- 2	2 1/2	+ 1/4	+11.1
O	IPS COMPUTER MARKET.	2- 3	3 1/4	0	0.0
O	KEANE ASSOCIATES	3- 6	5 1/2	+ 1/8	+2.3
O	KEYDATA CORP	1- 3	2	0	0.0
A	LOGICON	11- 19	19	+1 1/8	+6.2
A	MANAGEMENT DATA	1- 1	7/8	0	0.0
A	NATIONAL CSS INC	15- 36	35 3/4	+2 3/8	+7.1
O	NATIONAL DATA CORP	7- 12	11 3/4	+ 1/8	+1.0
A	ON LINE SYSTEMS INC	17- 28	28	+ 1/2	+1.8
N	PLANNING RESEARCH	4- 9	9 3/8	+ 5/8	+7.1
O	PROGRAMMING & SYS	1- 1	1	0	0.0
O	RAPIDATA INC	3- 7	7 1/4	+ 7/8	+13.7
O	REYNOLDS & REYNOLD	18- 36	31 3/4	-1 3/4	-5.2
O	SCIENTIFIC COMPUTERS	3- 7	7 1/2	+ 5/8	+9.0
O	TYMSHARE INC	18- 33	32 3/4	+ 1/2	+1.5
A	URS SYSTEMS	5- 7	6 7/8	- 1/8	-1.7
N	WYLY CORP	1- 5	4 5/8	+ 1/8	+2.7

PERIPHERALS & SUBSYSTEMS

EXCH		PRICE 1978 RANGE (1)	CLOSE AUG 23 1978	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	14- 32	29 3/4	-1 1/4	-4.0
O	ADVANCED MEMORY SYS	7- 17	16 7/8	+ 1/2	+3.0
N	AMPEX CORP	10- 17	16 3/4	- 1/8	-0.7
O	ANDERSON JACOBSON	5- 10	9 1/4	+1 1/4	+15.6
N	APPLIED DIG DATA SYS	13- 18	17 5/8	+2 3/8	+15.5
O	BEEHIVE INT'L	4- 7	5 3/4	0	0.0
A	BOLT,BERANEK & NEW	6- 11	9	0	0.0
N	BUNKER-RAMO	10- 19	18 1/2	+ 1/2	+2.7
A	CALCOMP	3- 10	10 1/8	+ 7/8	+9.4
O	CAMBRIDGE MEMORIES	3- 8	7 1/4	- 1/4	-3.3
N	CENTRONICS DATA COMP	16- 34	33 1/2	+3 1/2	+11.6
O	COGNITRONICS	1- 4	2 1/4	0	0.0
O	COMPUTER COMMUN.	6- 11	11 1/4	+ 3/8	+3.4
O	COMPUTER CONSOLES	4- 10	9	+ 1/2	+5.8
A	COMPUTER EQUIPMENT	3- 6	5 1/4	+ 7/8	+20.0
O	COMPUTER TRANSCEIVER	1- 2	2	0	0.0
O	COMTEN	5- 38	34 1/4	-2 5/8	-7.1
N	CONRAC CORP	19- 26	23 1/2	- 1/4	-1.0
O	DATA ACCESS SYSTEMS	3- 8	10 1/4	+2	+24.2
O	DATA 100	9- 20	18 3/4	0	0.0
A	DATA PRODUCTS CORP	15- 25	24 5/8	+1 7/8	+8.2
O	DATUM INC	2- 5	5 1/4	+1 1/4	+31.2
O	DECISION DATA COMPUT	2- 5	4 7/8	0	0.0
O	DELTA DATA SYSTEMS	1- 1	5/8	+ 1/8	+25.0
A	DOCUMATION INC	6- 29	28 3/4	+3 1/8	+12.1
O	DATARAM CORP	6- 24	18 1/2	- 1/4	-1.3
N	ELECTRONIC M & M	4- 8	7 1/2	0	0.0
O	FABRI-TEK	1- 2	1 3/8	- 1/8	-8.3
O	GENERAL COMPUTER SYS	1- 3	2 3/8	- 1/4	-9.5
N	HAZELTINE CORP	10- 16	14 1/4	- 1/2	-3.3
N	HARRIS CORP	40- 69	68 3/4	+1 3/8	+2.0
O	INFOREX INC	6- 10	9 1/2	- 1/8	-1.2
O	INFORMATION INTL INC	8- 12	10 3/4	-1 1/4	-10.4
O	INTEL CORP	39- 62	56	+ 1/2	+0.9
A	LUNDY ELECTRONICS	4- 5	4 7/8	- 1/4	-4.8
O	MSI DATA CORP	12- 19	16 5/8	+1	+6.3
N	MEMOREX	27- 57	57 1/4	+1	+1.7
N	MOHAWK DATA SCI	6- 15	13 7/8	0	0.0
O	OMEX	2- 2	2	0	0.0
O	PENRIL CORP	5- 12	10 1/8	+ 1/8	+1.2
N	PERTEC CORP	9- 14	13 5/8	+ 7/8	+6.8
A	POTTER INSTRUMENT	2- 2	1 3/4	0	0.0
O	QUANTOR CORP	2- 5	2 1/2	+ 1/8	+5.2
O	RECOGNITION EQUIP	7- 13	12 5/8	- 1/4	-1.9
O	SCAN DATA	1- 5	3 5/8	- 1/8	-3.2
N	STORAGE TECHNOLOGY	19- 46	30 1/4	+3 3/8	+12.5
O	T BAR INC	11- 19	17 1/2	+1	+6.0
O	TALLY CORP.	4- 9	7 5/8	+ 3/8	+5.1
A	TEC INC	6- 11	10 1/4	+ 1/4	+2.5
N	TEKTRONIX INC	33- 46	44 1/8	-2 1/8	-4.5
N	TELEX	3- 8	8	+ 3/4	+10.3
O	TESDATA SYSTEMS CP	13- 20	19 3/4	+ 1/2	+2.5
O	WILTEK INC	1- 1	7/8	0	0.0

SUPPLIES & ACCESSORIES

EXCH		PRICE 1978 RANGE (1)	CLOSE AUG 23 1978	WEEK NET CHNGE	WEEK PCT CHNGE
A	AMERICAN BUS PRODS	6- 10	10 1/4	+ 1/4	+2.5
O	BALTIMORE BUS FORMS	2- 5	3 1/2	0	0.0
A	BARRY WRIGHT	14- 28	26 5/8	- 1/2	-1.8
O	CYBERMATICS INC	1- 1	1 1/4	0	0.0
O	DUPLEX PRODUCTS INC	18- 30	29 1/4	+2 1/2	+9.3
N	ENNIS BUS. FORMS	8- 17	13 1/2	-1 1/2	-10.0
N	3M COMPANY	43- 65	64 3/4	+ 3/4	+1.1
O	MOORE CORP LTD	26- 34	30	-1 1/4	-4.0
N	NASHUA CORP	19- 31	30 1/4	+ 3/4	+2.5
O	STANDARD REGISTER	20- 26	24	+1 1/2	+6.6
A	TAB PRODUCTS CP	3- 16	15 3/8	+ 1/8	+0.8
N	USECO	19- 27	26	+1	+4.0
A	WABASH MAGNETICS	10- 19	18	0	0.0
N	WALLACE BUS FORMS	13- 32	31 7/8	+3 7/8	+13.8

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

HERE COMES THE EMM 303X ADD-ON MEMORIES

EMM is now accepting orders for its new 303X add-on memory series. In fact, we've already received orders for 7/3031, 7/3032 and 7/3033 units. Manufacturing is already underway. And, we expect quantity deliveries to begin in fall, 1978.

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EMM's 303X. First choice of those who know their add-on memory. Call **(800) 421-5964 ext. 260,** or your local EMM account representative. Let us show you why EMM is the only way to go when you want today's best add-on memory value tomorrow.

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